ELECTRICAL SOUTH

Serving the 18 Southern an

Distribution modernization
articles begin on page 61

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Why KUHLMAN'S Southern Factory Is Your Ideal Transformer Source . . .

Anywhere in the South you can get the transformers you need—when you need them—from Kuhlman. Our modern factory at Crystal Springs, Mississippi, and our trained Southern sales personnel (see map), will give you prompt service and fast delivery on all your distribution and power transformer needs. Kuhlman is proud to be part of the growing South, and to have been the first nationally known transformer manufacturer to build a factory in the South to serve the South.

FACTORY AT CRYSTAL SPRINGS, MISSISSIPPI

• 21 Sales Offices

▲ 12 Distributing Centers

CRYSTAL SPRINGS, MISSISSIPPI . . . both serving and contributing to the development of diversified Southern industry, this KUHLMAN factory produces a complete line of power and distribution transformers.

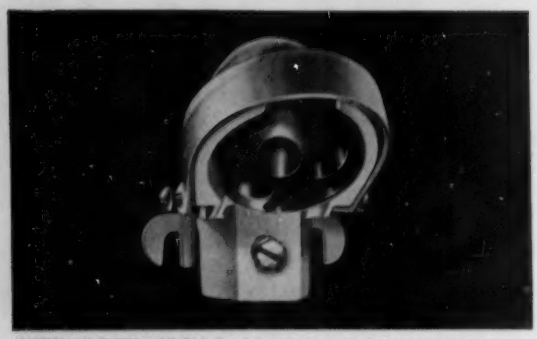
HOUSEPOWER HELPS YOU LIVE BETTER ELECTRICALLY

573

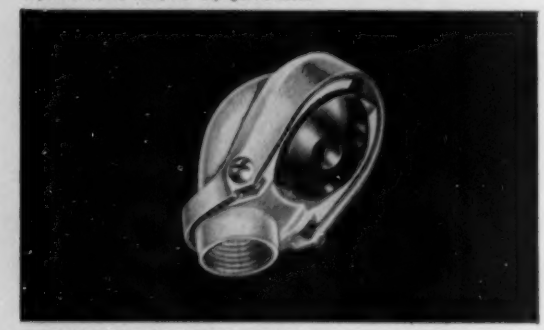
KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Cross the threshold to



"SPECIAL" ENTRANCE CAP for S.E. cables. With 5-hole insulator. Many inspection authorities require the use of special cables to meet particular requirements such as looking down a yard pole to meter box with a 5-conductor cable. Gedney, accordingly, designed this special entrance cap. Malleable iron; hot dip galvanized.



THREADED CONDUIT ENTRANCE CAPS Like most other Gedney entrance caps, this one is made of malleable iron to prevent breakage... hot dip galvanized for maximum service life. Sizes range from ½" to 6".

ENTRANCE CAPS for S.E. Cables—with key hole mounting bracket. Easy to assemble—cable slips into cap and is securely held by clamping shoe. Has split insulator and well bushed holes. Overlapping cover protects cables from weather. Malleable iron, hot dip galvanized.

Cross the threshold to lower costs...with

GEDNEY ENTRANCE CAPS

Malleable Iron—Hot Dip Galvanized

THESE ENTRANCE CAPS install faster—and cut your *final* costs right down to rock bottom. Like all Gedney Fittings they're accurately machined and threaded...smooth finished, with no burrs or metal particles. On top of that, the Gedney line includes many improved design features that bring extra efficiency and labor savings. For fittings that bring today's lowest installed cost, specify Gedney!

GEDNEY FITTINGS FIT

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Volume 36 **Number 11**

NOW

Southwire Vinyl

"IT'S TOUGH"

weather-resistant

▸ LINE WIRE

▸ SERVICE DROPS

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To meet the need for a high quality weather-resistant material for line wire and service drops, Southwire proudly presents a new covering—*Southwire Vinyl*—that is competitively priced!

It combines remarkable toughness and resistance to weathering. At the same time it provides a conductor jacket that results in a light, small diameter wire.

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Southwire means service

Southwire Company

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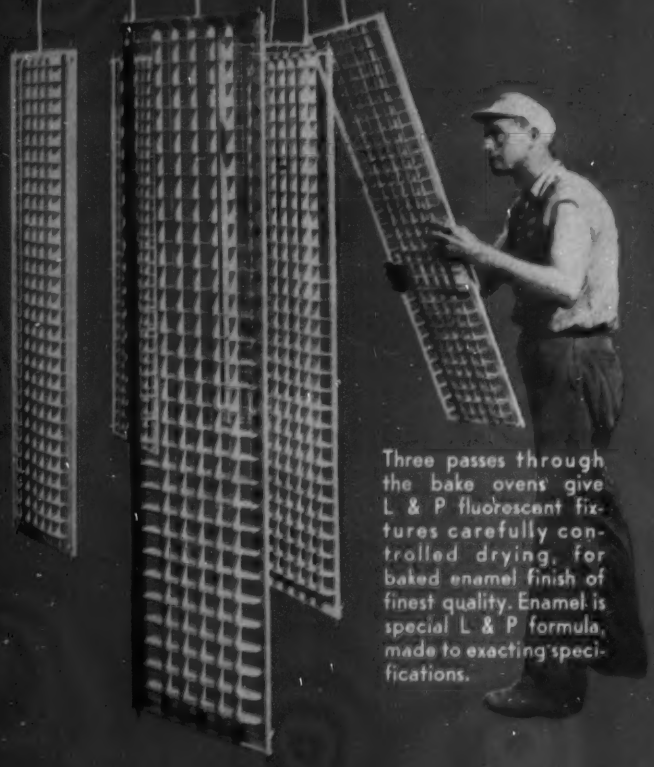
ALL ALONG THE LINE



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Tom Melady
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ELECTRICAL SOUTH

SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

November, 1956 — **Vol. 36—No. 11**

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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Bulwark of the economy

One of the most interesting and encouraging barometers of economic trends to watch is the rate of corporate expansion during the next few years. Plans for much of this activity are already on the drawing boards and it is becoming quite apparent that corporate leadership is pledging itself to continue the phenomenal rate of growth for some years to come.

Corporate expansion in 1956 has had to be refigured several times since the year's beginning to keep pace with modifications (usually increasing in cost). It appears now that business funds spent for this purpose this year will amount to some $35 billion or better. Early indications had led to a more conservative estimate in the area of $25 - $30 billion. This is tangible proof of the general optimism with which business leadership faces the days ahead.

Present estimates of the amount to be spent in 1957 for the expansion of business range from $37 to $40 billion. It is fairly certain that barring some very unforeseen circumstances this figure will also be on the conservative side.

For the most part these estimates are based upon the reported programs of the larger companies and industries and assess only an estimate of the aspirations of the smaller concerns. Since this is true, there is a possibly large margin of error in these latter tabulations. Experience has told, however, that this margin borders principally upon the conservative side particularly in periods of fair to good business conditions.

Election results

Conditions for the most part will not be affected by the election results. Industry has learned a very important lesson over the years and that is that plans for progress must be prepared for ten to twenty year periods and cannot be affected too seriously by four year election problems. Many plans actually approved and set in motion by the nation's corporations will not be in place before 1965, yet the firms are committed through policy formulation to carry them out.

One should not believe that such plans cannot be modified or even delayed, because this action is certainly possible. However, the very fact that business leadership is developing such expansion practices will do much to maintain the status of present prosperous business conditions. The heavy volume of these expenditures has done much to soften the blow of gradually decreasing government defense spending so that a situation that could have easily promoted some recession tendencies in the economic scene has been felt hardly at all.

Small business credit

A major difficulty in the operation of a small business is the availability of sufficient credit to maintain normal operations. Even in these days of extensive credit and soaring installment sales the small businessman frequently finds it to be nearly impossible to get the credit he needs from available banking facilities.

Such a situation over which the businessman himself has little or no control can make the difference between a moderately successful operation or business failure. How serious this situation has become is easily uncovered through publications and statements of several government agencies. Moreover, it has been a significant political question in the campaign just ended.

The truth of the matter is that there has been a great improvement in credit extended to small business by banks and other lending agencies. The American Bankers Association in a recent survey produced an interesting light upon the problem. This survey studying the credit operations of seventy-eight large banks throughout the nation found that loans of under $100,000 had increased by 5 per cent between August 1955 and August 1956. It is in this category that the financing of most small business falls. In fact, the same report indicates that loans to small business have increased at a rate faster than those to larger business enterprises.

This increase of 5 per cent does not solve all problems in the realm of the financial supporting of small business. Yet it does indicate most effectively that small business has not been lost sight of in the development of massive corporations. The small merchant or businessman may well recognize that he must indicate quite conclusively that he is a good credit risk before the bank loan may be forthcoming. Yet if he can prove the worth of his organization and the service performed, then there is credit available to an increasing extent.

The major problem in small business management and operation is the heavy failure rate. This, in large part, is based upon a lack of managerial "know-how" often encountered in the small firm. Until small business can take advantage of the techniques of good business management there will still be many failures in these ranks.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

ask the man who
installs them!
STEEL
CITY
BOXES and FITTINGS
PRODUCTS OF STEEL CITY ELECTRIC COMPANY
PITTSBURGH 33, PENNSYLVANIA

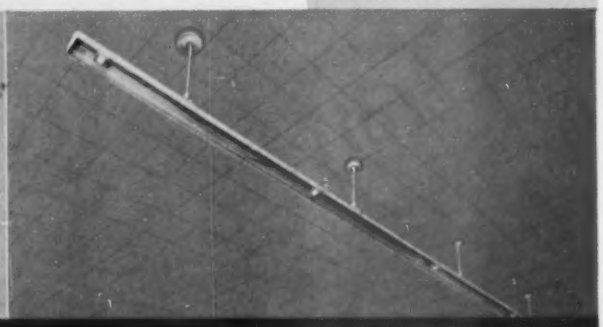
THE LIGHTS THAT GO IN WHEN THE PAINTERS GO OUT...

No On-Job Storage. No Paint-Spattered Fixtures. 50% Savings on installation costs.

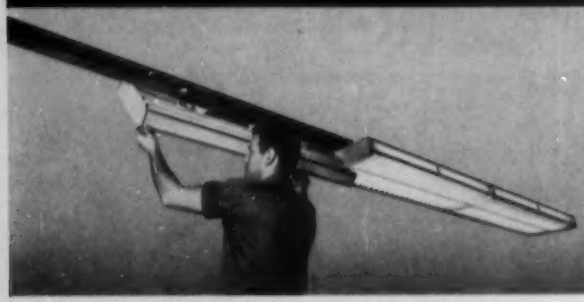
Gibson ORTHO Fixtures need not be stored on the job where they're in the way of workmen and in danger of damage. Actually, Gibson ORTHO Fixtures can be delivered to the job the day before occupancy, because each fixture simply snaps into place in a matter of seconds, just as it comes from the box —sparkling clean, factory-fresh.

If you're interested in better lighting with savings of more than 50% on installation costs, then you really ought to know more about the Gibson ORTHO Line for industrial and commercial applications. Drop us a line. We'll send you the whole story.

1. WIRED ON THE FLOOR • A special channel (UNI-RACE) of telescoping 4' or 8' sections is assembled and wired on the floor, then lifted as a unit and mounted directly on joists, I-beams or stems. Saves hours of labor.



2. READY FOR THE FIXTURES • The UNI-RACE in place showing the built-in receptacles at 48" intervals. While the building is under construction, it will serve as a source of power for tools and temporary lighting.



3. SNAP—AND IT'S UP! • When the painters have left, the fixtures can be delivered to the building and snapped into place as fast as they are unboxed. Each fixture has a built-in plug which engages the receptacle in the UNI-RACE. Fixtures align themselves automatically.

4. VARIABLE SPACING • Fixtures may be installed in continuous rows or spaced at intervals of 4, 8, 12 or more feet. Units may be added, removed or rearranged any time without tools. Special "fill-in" sections close the UNI-RACE where no fixtures are mounted.

® AND PAT. PENDING

Gibson LIGHTING

GIBSON Manufacturing Co.

1919 Piedmont Circle, N.E., Atlanta 5, Georgia

PRODUCTS OF **STEEL CITY** ELECTRIC COMPANY
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The 1957 edition of the ELECTRICAL SOUTH Directory will be available December 15, 1956

Now, a special Directory for the use of the Southern and Southwestern electrical trade has been published by ELECTRICAL SOUTH.

This Directory of Electrical Manufacturers and their Southern and Southwestern Representatives has been a "smash hit" because it fills a long felt need. The tremendous increase in electrical business in the South in recent years has led many more electrical manufacturers to establish representation in this fast growing area. These representatives offer valuable services to the electrical wholesalers and the electric utility companies, as well as other branches of the electrical industry.

In compiling this Directory, we have endeavored to furnish the most complete listing possible of all electrical manufacturers in alphabetical order together with their Southern and Southwestern representatives.

For convenience, a number of manufacturers have included cross-reference advertising on their products. This extra service will help locate special facts and specifications and other pertinent product data.

So far as we know, this is the first Directory of its kind ever published for the Southern electrical trade.

You may obtain your copy at a cost of only $2.50. Address order to:

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And when you add to these time-saving and money-saving advantages, features like noiseless operation, silver alloy contacts, an "L" rating for 15 amperes, 120 volts, you'll agree A-H Junior Quiette Switches are a must on the next job . . . and all jobs to follow.

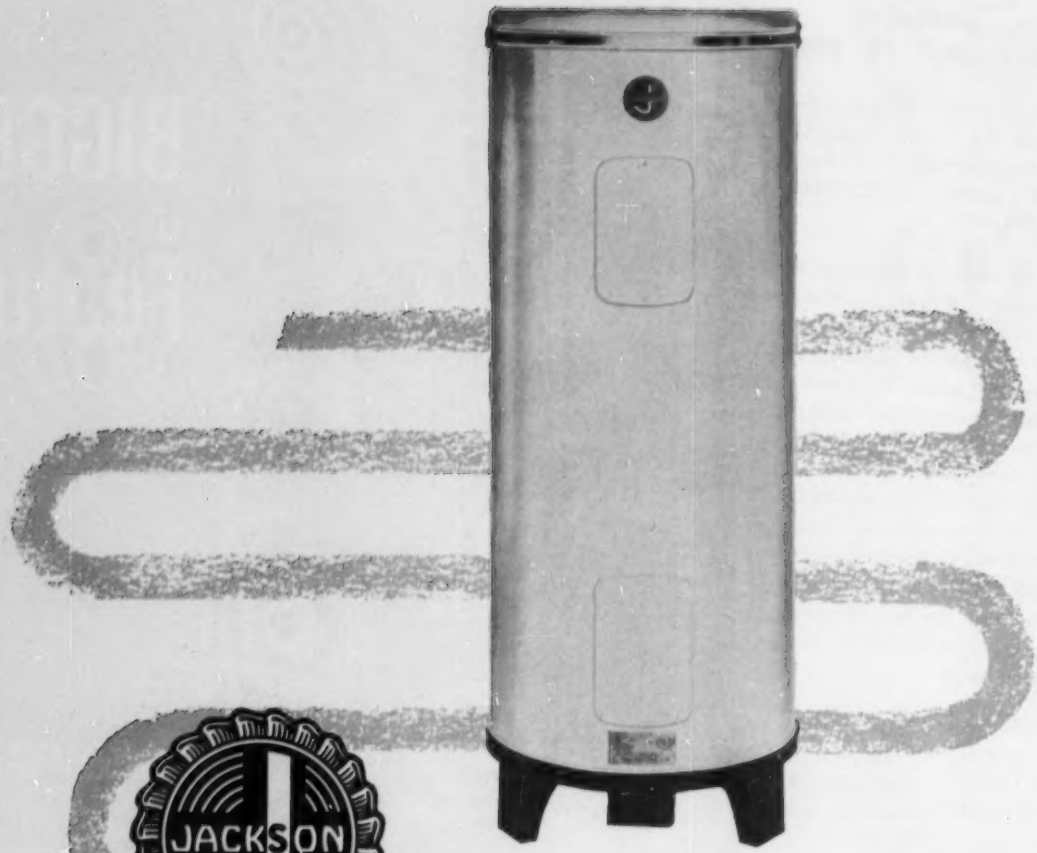
Available in single pole, double pole, 3-way and 4-way with Ivorylite or Brown handles. Listed as standard by Underwriters' Laboratories.

Write for free folder (Form A-198), "A-H Quiette Switches Meet Every Lighting Requirement."

ARROW AH HART

Wiring Device Division
THE ARROW-HART & HEGEMAN ELECTRIC CO.
103 Hawthorn Street, Hartford 6, Connecticut
Offices, Sales Engineers and Warehouses in Principal Cities

Quality WIRING DEVICES • MOTOR CONTROLS • ENCLOSED SWITCHES • APPLIANCE SWITCHES



JACKSON

Only the finest!

JACKSON, through the years, has used only the finest in top quality parts and materials. That's why, when it came to choosing an insulating material for JACKSON Water Heaters, Fiberglas was the winner. Fiberglas — the finest insulating material made by man!

Efficient, non-corrosive, sanitary, moisture-resistant, non-combustible and resilient, Fiberglas does not shrink, expand or warp!

And it's lighter — saves many dollars in shipping costs alone!

It's the finest insulation and — naturally — JACKSON uses it! Another example of JACKSON'S careful quality control.

For information on the COMPLETE line of JACKSON Gas and Electric Water Heaters contact your Jobber.

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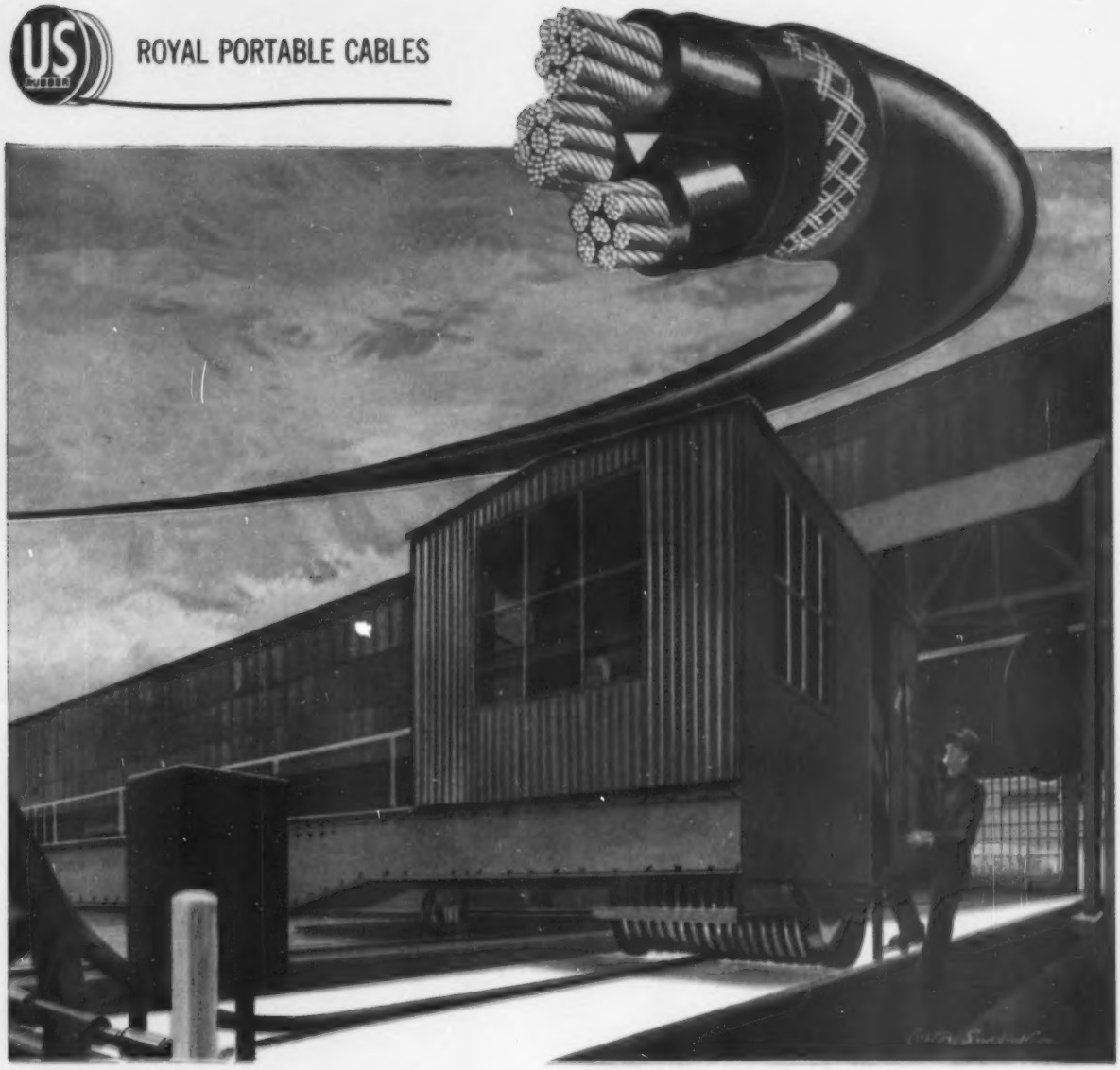
1222 EAST 40TH STREET CHATTANOOGA 7, TENN.

Quality WIRING DEVICES • MOTOR CONTROLS • ENCLOSED SWITCHES • APPLIANCE SWITCHES

US RUBBER ROYAL PORTABLE CABLES



Still in Service after 29 years, 24 hours a day

and without a single splice, patch or power failure!

This amazing record was made by a 175-foot length of U. S. Royal portable cable installed in 1927 as a source of power for a traveling agitator in a cement plant*. This three-conductor cable has been fully exposed to weather for the entire 29 years. The agitator moves back and forth the length of the slurry basin, and the cable is simultaneously taken up and paid out by a revolving drum.

To "U. S." engineers, performances such as this are not too unusual. They stem, right at the start, from the determination of "U. S." technicians to produce only a *quality* product. This is possible because "U. S." is the only wire manufacturer to grow its own natural rubber, make its own synthetic rubber and its own plastics, assuring complete quality control with the help of unmatched research and manufacturing facilities.

Call on the "U. S." wire and cable specialist to solve any wiring problem. Write United States Rubber Company, Rockefeller Center, New York 20, N. Y.

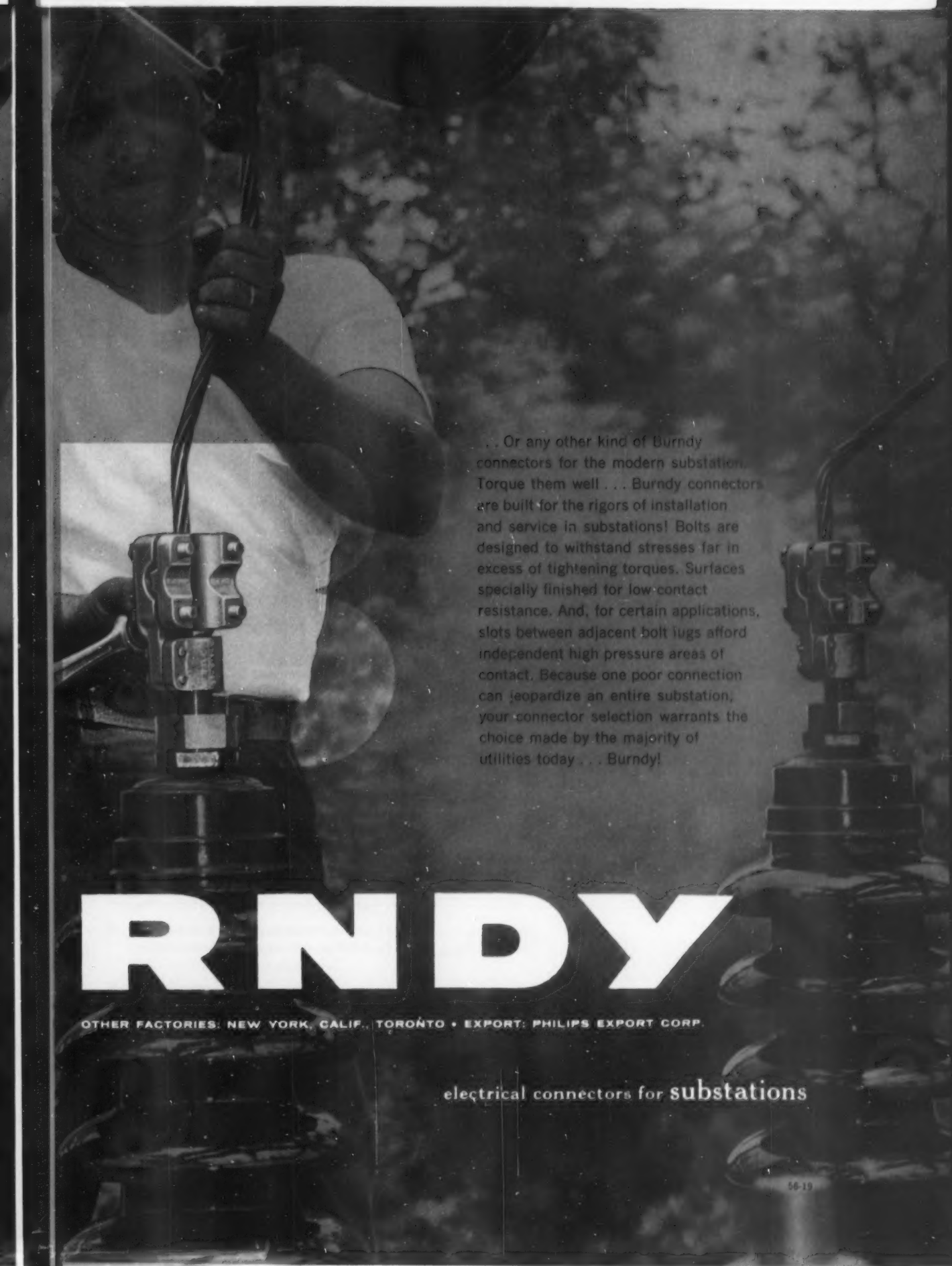
*Penn-Dixie Cement Corp., Tenn.

Watch NCAA football, Saturday afternoons, NBC-TV

US RUBBER **Electrical Wire & Cable Department**

United States Rubber

let's "torque"...stud connectors!
BU
NORWALK, CONNECT.


. . Or any other kind of Burndy connectors for the modern substation. Torque them well . . . Burndy connectors are built for the rigors of installation and service in substations! Bolts are designed to withstand stresses far in excess of tightening torques. Surfaces specially finished for low contact resistance. And, for certain applications, slots between adjacent bolt lugs afford independent high pressure areas of contact. Because one poor connection can jeopardize an entire substation, your connector selection warrants the choice made by the majority of utilities today . . . Burndy!
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OTHER FACTORIES: NEW YORK, CALIF., TORONTO • EXPORT: PHILIPS EXPORT CORP.
electrical connectors for substations
56-19

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

1011—Electrical Conduits

"Natural Electric Conduits" is the title of the 30-page Catalog No. 603 which describes and illustrates the many types of electrical conduits that are manufactured by National Electric Products Corp., 2 Gateway Center, Pittsburgh 22, Pa.

1015—Squeezon Connectors

The Squeezon, a new compression connector for power lines, is fully described in bulletin "SQ" available from the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo. The Squeezon features greatly increased electrical and mechanical efficiency.

1019—Service Panels

Information on protective electrical control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-355, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Mich.

1071—Plugs and Receptacles

Additional loose-leaf sheets for insertion in the Pylet Catalog 1100 are available from the Pyle-National Co., 1354 N. Kostner Ave., Chicago 51, Ill. These pages describe a wide range of plugs and receptacles for special purposes.

1079—Washer Lugs

Krueger and Hudepohl, 3 E. Third St., Cincinnati 2, Ohio, in their Bulletin 8-DF, give information and catalog listings for their complete line of K&H solderless terminal folding double cupped washer lugs. The folder explains uses and applications of all the lugs.

1085—Lighting Fixtures

Eastern presents their most complete catalog, 32 pages of engineered lighting data, including a variety of fixtures for all architectural, commercial and industrial applications. Eastern Fixture Co., Inc., 170 Vernon St., Boston 20, Mass.

1087—Fittings Catalog

The M. & W. Electric Mfg. Co., Inc., East Palestine, Ohio, has available their new 28-page catalog 53, covering Service Entrance Mast Fittings, Service Entrance Cable Fittings, Ground Clamps, Rods, BX and Romex Connectors, Conduit Fittings, Wireholders, Insulators Supports and Cable Racks.

1097—Cord Catalog

A complete 48-page catalog is available from the Cornish Wire Co., 50 Church St., New York 7, N. Y. containing all data on flexible and portable cords, lamp cords, heater cords, cordsets, radio and electronic wires.

1099—Lighting Fixtures

Fluorescent and incandescent luminaires for schools, offices, stores and factories are illustrated in a series of bulletins issued by Curtis Lighting, Inc., 6134 West 65th St., Chicago 38, Ill. The entire series or any individual bulletins may be obtained upon request.

1103—Compression Connectors

Burndy's new Bulletin CR-1A features the new Crimpit technique for all overhead distribution connections. The bulletin provides information on the entire Cripit line, including details of hydraulic installation tooling and accessories. Copy available from Burndy Engineering Co., Inc., Norwalk, Conn.

1107—RW and RHW Wire

"The Ampere Squeezer," a booklet explaining visually the effect of ambient temperatures on current carrying capacities of RW and RHW Wire, Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass.

1109—Anchoring Devices

An illustrated 32-page catalog, No. 65, describing more than 25 anchoring and drilling devices for making fastenings to masonry, is available from the Arro Expansion Bolt Co., Marion, Ohio.

1135—Wiring Devices

Catalog No. 51, containing complete electrical wiring device line of Leviton Mfg. Co., Brooklyn 22, N. Y. is a 96-page thoroughly illustrated one. Included are such features as the Kwik-Change line, with wiring diagrams, a general index, and an index to catalog numbers.

1155—Wire and Cable

Two catalogs—Bulletin RS-5, and Power and Control Cables, No. 24—available from Rome Cable Corp., Rome, N. Y. Power and Control Cables catalog is intended for utility, construction, and industrial engineering and purchasing personnel as a guide in selection of proper wire and cable types.

ELECTRICAL SOUTH
806 Peachtree St., NE **Nov. 1956**
Atlanta 8, Ga.

Gentlemen:

Please send me the bulletins and catalogs indicated.

(Print Plainly)

Name _____ **Title** _____

Company _____

Address _____

City & State _____

Circle numbers below. Bulletins and catalogs will be mailed promptly.

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1085	1087	1097	1099	1103
1107	1109	1135	1155	1167
1169	1175	1195	1197	1209
1211	1217	1219	1223	1227
1229	1231	1233	1237	1239
1241	1243	1245	1247	1249
1251	1253			

▲ Bill Johnson (right), Superintendent of Spang's Coupling Department, points out top-quality electroplated finish and uniform threads on Spang HD Coupling to Spang customer and Spang's Chief Inspector, Bill Mickley.

▼ Mark Glusic removes a basket of couplings from the electroplating tank. This finishing process protects threads, gives extra protection to exterior surfaces.

Nobody Makes Couplings Better than SPANG®

Check these 6 top-quality features that bring you easier, better conduit installations

1. **Top-grade steel** . . . SPANG Couplings are made of top-grade, free-machining steel which provides easy threading for best results during coupling manufacturing.
2. **Quality-controlled processing** . . . couplings receive the same care in manufacturing as SPANG HD Galvanized Conduit. Thorough testing and inspection, too!
3. **Galvanized finish** . . . hot dipped in lengths before cutting and threading . . . another SPANG extra.
4. **Electroplated** . . . inside and outside after threading to protect interior threads and bearing faces and give exterior surfaces double protection.
5. **Clean threads** . . . perfect every time! No burrs, no binding, easy to work with!
6. **No galvanic action** . . . electroplated and galvanized finish prevents metal-to-metal contact between couplings and conduit . . . avoids any galvanic action.

If it's *quality* you want, SPANG Couplings have it! Your local SPANG Distributor carries the full range of coupling sizes along with the rest of the complete SPANG Conduit line. Let him fill your next order.

SPANG® CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities

1167—Industrial Lighting

A four-page catalog insert is now available from the Multi Electric Mfg. Co., Inc., 4223-43 West Lake St., Chicago 24, Ill. The leaflet describes Multi's line of lighting equipment and wiring devices, which include floodlights, vaporproof fixtures, and fluorescent and incandescent fixtures.

1169—Lighting Fixtures

A new 50-page catalog giving illustrations, specifications, and test data for more than 20 industrial, commercial, and residential fluorescent and slimline luminaires has been released by Sta-Brite Fluorescent Manufacturing Co., P. O. Box 6352, Miami, Fla. A section is devoted to Sta-Brite equivalents for federal specifications on fixtures.

1175—Fluorescent Fixtures

Light & Power Utilities Corp., 1035 Firestone Blvd., Memphis, Tenn., has printed a new catalog of fluorescent lighting fixtures. The new catalog is divided into six sections, each printed in its own distinctive colors. First section is devoted to "General Data" and details of L&P manufacturing.

1195—Kitchen Ventilation

Descriptive eight - page folder, Bulletin 620H, showing typical installations of all models in the Clipper line of ventilators is available from Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif. Folder includes dimensional drawings of installations helpful to building and electrical contractors.

1197—Convenience Outlets

Four-page bulletin gives complete information on the new P&S No. 500 for adding extra outlets to existing installations. Everything you need in a single package—no steel boxes required. Available from Pass & Seymour, Inc., Dept. ES, Syracuse 9, N. Y.

1209—Fluorescent Ballasts

Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has recently completed the compilation and printing of a 20-page catalog on fluorescent ballasts and their use. Included are data sheets on available Advance ballasts and a comprehensive installation and operation section and testing procedures. Copies of the booklet are available on request.

1211—Fluorescent Fixtures

Catalog folder No. 911, "Peerlite by Guth," has been announced by the Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo. Copies of this new eight-page booklet are available from the company upon request. The booklet is designed for the lighting specialist, giving complete engineering data and dimensions.

1217—Hinged Louvred Ceiling

Light weight, has no visible supporting tracks, producing unbroken louvre pattern in all directions. Perfect alignment assured—it's prefabricated. Louvred ceiling can be combined with fascia plates to form any architectural pattern desired. Catalog No. 544 has full details including installation instructions. Neo-Ray Products, Inc., 315 East 22nd St., New York 10, N. Y.

1219—Electrical Enclosures

Catalog No. 5354-U is a 66-page catalog describing the complete line of steel and aluminum electrical enclosures manufactured for utility use by the B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga. The catalog is well illustrated and contains complete specifications as well as prices on al items in the B & C line.

1223—Circuit Protection

A 24-page illustrated handbook contains suggestions for selecting the right kind of protection for electric circuits, motors, appliances and apparatus. Includes motor wiring diagrams and a complete list showing proper size fuses to use. Available from Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1227—Conduit Fittings

A new complete 48-page catalog conduit fittings and lighting parts illustrating their complete line of for the electrical wholesaler has been made available by Elliott Electric products Co., 1513 Olmstead Ave., New York 62, N. Y.

1229—Switch and Outlet Boxes

A new RACO General Catalog is now available listing detailed information on boxes, covers, and bar hangers. The catalog includes data on number of wires permitted per box and a list of comparative catalog numbers. Copy available from All-Steel Equipment, Inc., Aurora, Ill.

1231—Conduit

A handy, pocket-size booklet illustrating and describing four ways to greater conduit efficiency and lower installation costs has been published by Youngstown Sheet and Tube Co., Youngstown, Ohio.

1233—Troffer Catalog

A 36-page catalog, with complete information on their newly re-designed architectural troffers has been released by Smithcraft Lighting Division, Chelsea, Mass. Divided into sections for selection of lighting units, the catalog gives complete illustrations and data for 1 and 2 foot troffers in all types of ceiling construction. Also included in the catalog is information on ceiling lighting patterns, shielding designs, lighting techniques and applications.

1237—Wireholders

Knox Porcelain Corporation, Knoxville 1, Tenn. has recently redesigned a one-piece metal base style reinforced wireholder, No. 5009. Base and screw are hot dipped galvanized. This wireholder has extra sharp threads and quick starting point to make driving easy. KNOX manufactures a complete line of Porcelain Wireholders, House Brackets, and other Secondary Service Materials.

1239—Heavy and Light Duty Power Derricks

J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio, has available a 4-page catalog on the Series 4700 Power Derrick—a light-duty derrick that lifts loads to 6500 pounds, poles to 55 ft. They also have available a catalog on 3700 Power Derrick containing data on derricks for lifting poles up to 75 feet long and loads up to 12,000 pounds.

1241—Fans

A convenient file folder covering attic and industrial ventilating fans, up to 108" diameter, is available upon request from American Coolair Corporation, Box 2300, Jacksonville 3, Florida. The attractively illustrated catalog pages are bound into the folder, which is available with or without list price sheets.

1243—Lighting Fixtures

The Alkco Catalog for 1956, illustrating their complete line of fluorescent and incandescent lighting fixtures, has recently been released by Alkco Manufacturing Co., 4242 Lincoln Ave., Chicago 18, Ill.

1245—Exhaust Fans

Two new two-color illustrated four-page catalogs (Bulletin Nos. 6414 & 6514) describing the new Model G Ventura fans for business and commercial exhaust applications and Model K for industrial heavy-duty exhaust applications are now available from American Blower Corp., Detroit 32, Mich.

1247—Packaged Service Center

A chart for selection of Uni-Pak interiors, back boxes, and panels, as well as complete information on these products, is now available from Walker Electric Company, Inc., 125 Bennett, N. W., Atlanta, Ga.

1249—Knox Wiring Devices

A recent catalog published by Knox Porcelain Corp., Knoxville 1, Tenn. gives complete information on their line of wiring devices, fuse blocks and cutouts, neon sign insulators as well as standard porcelain and electric fence equipment.

1251—Radiant Heating Cables

Three folders, describing Ceilheat's three types of radiant cables, are now available from Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn. One folder features the Aristocrat radiant cable for plastered ceilings, another describes Ajax radiant cable for concrete floors, and the third describes Dri-Cell radiant cable for dry-wall construction.

1253—Power Connectors

A completely new catalog (No. 526) of power connectors and bus support clamps is now available from Southern States Equipment Corp., Hampton, Ga., superseding catalog No. 525-R. Furnished in a handsome 7-ring binder, the new catalog includes sections on bus support clamps, couplers and angle braces, bar connectors, Tee connectors, stud connectors, ground connectors, parallel clamps, and terminals.

MIKE THE MOLE SAYS: *Give the GUY a CHANCE*

there's a CHANCE ANCHOR for every guying need

8-WAY EXPANDING

The guy load is distributed all around the anchor—no wasted space between blades. Usually installed in clay or loam.

NEVER-CREEP

Made of structural steel. Pulls entirely against solid, undisturbed earth. For extra heavy loads in clay or loam.

NO-WRENCH SCREW

For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.

CROSS-PLATE

For heavy-duty anchoring in machine-bored holes. Holds better than logs or slugs. Saves time and money.

SWAMP SCREW

For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

8-WAY CONE

Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

EXPANDING ROCK

No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.

WRENCH TYPE SCREW

All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.

POLE KEY ANCHOR

Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested urban areas.

Both the soil type and condition are important factors in determining the type of installation and the kind of anchors to use. That's why Chance Anchors are made in so many types and sizes. The anchors shown above are made in a wide variety of sizes. Each type is designed for certain soil and guying conditions. Each of these anchors will do its specific job better than any other anchor you can choose.

Protect your investment in line construction. Analyze your soil and guying conditions, and specify the Chance Anchors that meet your particular requirements.

There is a CHANCE Anchor Distributor in your area who can probably fill your order directly from stock.

Specify CHANCE for Service!

A·B·CHANCE CO·

CENTRALIA, MISSOURI

CA56-19

for time-saving, money-saving ONE-STOP SHOPPING...

GO GLOBE

GLOBE HAS EVERYTHING!

The Globe line is a *complete* line — for every decor, every room, every need — indoors or outdoors! The Globe line is a *big* line — all-inclusive in its styling, its materials, its finishes. It has all the answers to the most subtle variations of consumer preference, the most precise decorator requirements of the designer. At Globe, leader in lighting for 34 years, research into lighting trends is a continuous process. Globe watches, anticipates, *sets* trends in lighting fashion. Our production facilities are unsurpassed, our quality the standard of comparison! You can fill all your needs at Globe — the one-stop shopping center of the industry!

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GLOBE

Visit our brand new Showroom, at the same address
16 East 40th Street, just off Fifth Avenue in New York City.
Write today for your copy of the new 44-page full color Globe catalog.

GLOBE LIGHTING PRODUCTS, INC.
1710 FLUSHING AVENUE • BROOKLYN, NEW YORK
Our 34th year • *Plants in New York and Los Angeles*

Equipment standardization and higher voltages help Duke Power to

KEEP AHEAD OF RAPIDLY RISING LOAD

Duke Power Company with headquarters in Charlotte, North Carolina serves a 24,000-square-mile area in the Piedmont Carolinas containing 2.9 million people. A population boom since World War II has sky-rocketed Duke's residential load from 349 million kw-hr in 1945 to over 2 billion kw-hr in 1955. At the end of World War II, residential represented only 10% of the company's total load. Today the residential load accounts for over 20%.

Along with the population influx, textile and other industries have moved into the area, posing a problem for Duke engineers: how to meet the ever-changing needs of the present, and prepare for future load growth.

Duke Power has a two-fold solution to be achieved through overlapping plans based on five- and ten-year forecasts. Equipment is being standardized and higher distribution voltages are being employed where beneficial. Flexibility keynotes the success of the plans, permitting modifications for changing markets and growth patterns.

TURN PAGE FOR MORE DETAILS ▶

MORE POWER TO AMERICA

GENERAL ELECTRIC

MEETING TOMORROW'S DISTRIBUTION NEEDS

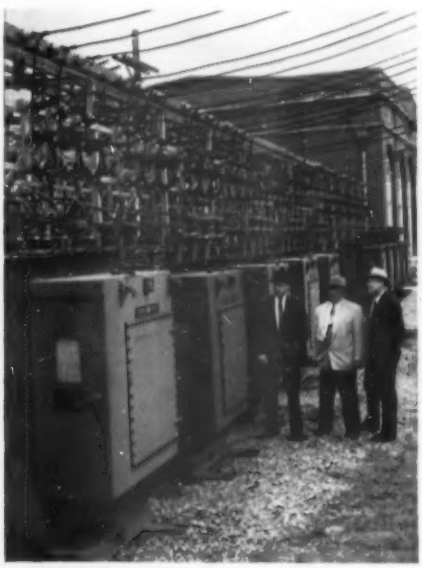
Duke Power

CO-OPERATIVE TEST by Duke Power and General Electric has been conducted for over a year on this 240-v, 5%, 3-kvar series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. P. D. Huff of Duke Power, l., and J. P. Ruddell of General Electric discuss test.

GREATER SYSTEM FLEXIBILITY, lower-cost future expansion are assured in Charlotte, by G-E network transformers connected for 277/480Y spot network, one of several such installations. Discussing it (l. to r.): J. W. Foster, Duke; J. P. Ruddell, G.E.; F. W. Edwards, Duke; and J. R. Stevenson, G.E.

STREET LIGHTING in Duke Power's service area includes such examples of progressive community activity as these General Electric Form 400 luminaires which provide comfortable vision on Highway 21, Charlotte, North Carolina.

LONG LIFE, reliability, and minimum maintenance are features of I-55 meters. This meter test by J. R. Griggs of Duke Power is observed (l. to r.) by R. D. Hilley, G.E.; and J. J. Strickland of Duke.



EQUIPMENT RELIABILITY is shown by these General Electric step-voltage regulators, which have operated over 140,000 times each in 3½ years without excessive contact wear. (L. to r.) J. P. Ruddell, G.E.; G. T. Finger, Duke Distribution Engineer; S. W. Johnson, G.E.

streamlines its distribution system through five-year and ten-year plans

Standardization on General Electric equipment helps increase system flexibility

The rapid expansion of textile mills in the Piedmont Carolinas—Duke Power's service area—has increased the need for considerably more electric power over a relatively short period of time. Much of it must be distributed over rugged terrain and hilly countryside, making equipment reliability of paramount importance. And, modern textile mills with integrated operations have exacting requirements.

Duke Power engineers, calculating on the basis of five- and ten-year forecasts, programmed a transition to standardized equipment for economy. They are also increasing voltages from 2400/4160 to 7200/12470, and in some areas 14400/24900Y, for improved system regulation and increased flexibility.

DISTRIBUTION SYSTEM COMMITTEE for Duke Power sits in session regularly at Charlotte, N. C. to discuss present problems and future planning—an interplay of ideas resulting in creative approaches. Here, P. A. Fry points out advantages of using reclosers. Seated at his right is Chairman C. B. Miller, Assistant Supervisor of Branches.

Typical of Duke Power's progressive attitude is the co-operative test with General Electric of a 240-v, 5 per cent series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. This effort to achieve approximate self voltage regulation of individual transformers serving low-power-factor air-conditioning loads is a good example of searching out the advantages of new apparatus and the guidance of General Electric application engineers.

When you specify General Electric, you take advantage of the latest advances in apparatus design, construction and application. That's because General Electric engineers are trained to translate the trends and needs of growing systems as reported by field personnel, incorporate newest materials and manufacturing techniques in producing them, and provide help in putting these advances to best possible use on your system.

And to help utilities keep service running smoothly, highly trained General Electric service engineers plus a nation-wide network of Service Shops stand ready to meet any and all maintenance and repair needs—day and night.

For full information on distribution equipment and distribution system services, contact your nearby General Electric Apparatus Sales Representative, authorized Agent, or Distributor today. General Electric Company, Schenectady 5, N. Y. 303-2

TURN PAGE FOR MORE ON MEETING TOMORROW'S DISTRIBUTION NEEDS ▶

MORE POWER TO AMERICA

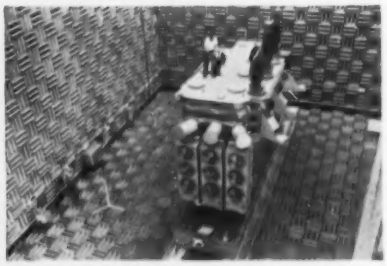
GENERAL ELECTRIC

ASSISTANCE FOR UTILITY ENGINEERS is provided by local application engineers. They spur use of latest ideas, product advances, help with system designs and equipment selection. These engineers are analyzing a system design problem.

Constant exchange of advanced ideas helps

General Electric application engineers aid utilities with sound system planning

More reasons why it pays to see General Electric about your distribution problems



BETTER EQUIPMENT comes from continuing product development. Above, General Electric's $1,500,000 anechoic chamber is used to study power transformer noise.

GENERAL ELECTRIC INVITES utility engineers to study meetings, thereby helps them plan distribution systems and products. Interflow of ideas helps answer latest field problems.

ENGINEERING TRAINING includes Power Systems Course, Electric Utility Systems Course, board studies.

Duke Power is a typical case of cooperative engineering. General Electric application engineers worked closely with Duke Power engineers in planning network transformers in Charlotte, N. C. These transformers are now used in a 277/480-v spot network radial system. Future conversion to a network system —according to the dictates of load growth—will be less costly, as new load and new transformers can be added to a network system without making additional system studies.

The full range of General Electric's distribution system services includes headquarters system planners—district application and product engineers—extensive product development facilities —equipment installation and field service engineering—complete interflow of ideas. These services offer assurance of maximum operating continuity, on-the-spot application help, greater equipment efficiencies, valuable help in system design and techniques. Get the full story from your General Electric Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 303-2

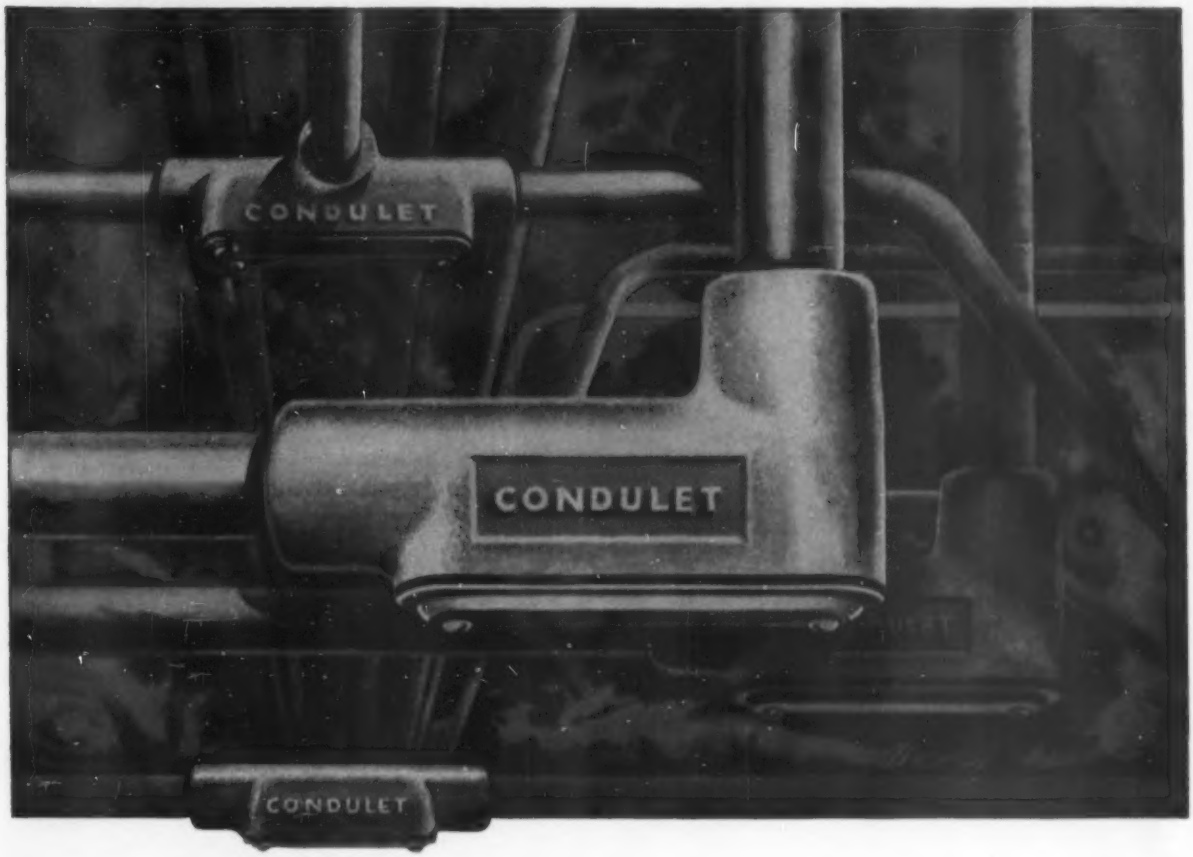
LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

Nothing Beats

CONDULETS* and RIGID CONDUIT for FLEXIBILITY, SAFETY, ECONOMY



- **INSTALL ANYWHERE.** Crouse-Hinds Condulets and rigid conduit operate safely and efficiently under all atmospheric conditions and in all occupancies.
- **INCREASE CAPACITY EASILY.** You don't have to tear out and replace the entire system: merely pull additional wires or put in a larger size.
- **ASSURES MAXIMUM SAFETY.** Condulets are Taper-Threaded to provide a permanent low resistance path to ground.
- **GREATER DURABILITY.** Condulets and rigid conduit provide circuits with more protection against physical damage than any other wiring system. Further, Condulets are made of galvanized cast Feraloy, and resist corrosion.
- **LOWER OVER-ALL COST.** First cost is the entire cost — a minimum of maintenance is required.

COMPLETE FLEXIBILITY

There's a Condulet to meet every need of complex modern electrical layouts. See your Condulet Catalog.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

CROUSE-HINDS COMPANY

Main Office and Factory: Syracuse, N. Y.
Crouse-Hinds Company of Canada, Ltd.: Toronto, Ont.

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One in a series to emphasize the economy of Electrical Wholesale Distribution

"...So why should I think up another torture for you here— you just keep right on trying to buy electrical supplies direct."

"Electrical Wholesaler Distribution reduces the Manufacturer's selling cost and thereby reduces the selling price of electrical supply material to the user. Therefore, our policy has been to distribute Thomas & Betts products exclusively through the Electrical Wholesaler."*

LOOK FOR THIS SIGN — AUTHORIZED DISTRIBUTOR T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED **T&B** DISTRIBUTOR

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INCORPORATED

72 BUTLER STREET, ELIZABETH 1, NEW JERSEY

THOMAS & BETTS, LTD., MONTREAL, P. Q., CANADA

MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

*Quoted from the T & B Plan of Wholesaler Distribution. If you would like to know the complete story of the T & B Plan, write:

PACKAGED TO DO BUSINESS

Carol Cable is easy to sell because it's easy to stock. Convenient cartons tell at a glance the type of cable . . . provide for perpetual inventory control. Boxes are sturdy, easy to handle, and are self-dispensing. Because Carol Cable gives reliable, long-lasting service, you'll keep old customers coming back . . . make new ones. Find out how Carol quality cable in a quality package can pay off for you.

A SUBSIDIARY OF Penn-Texas

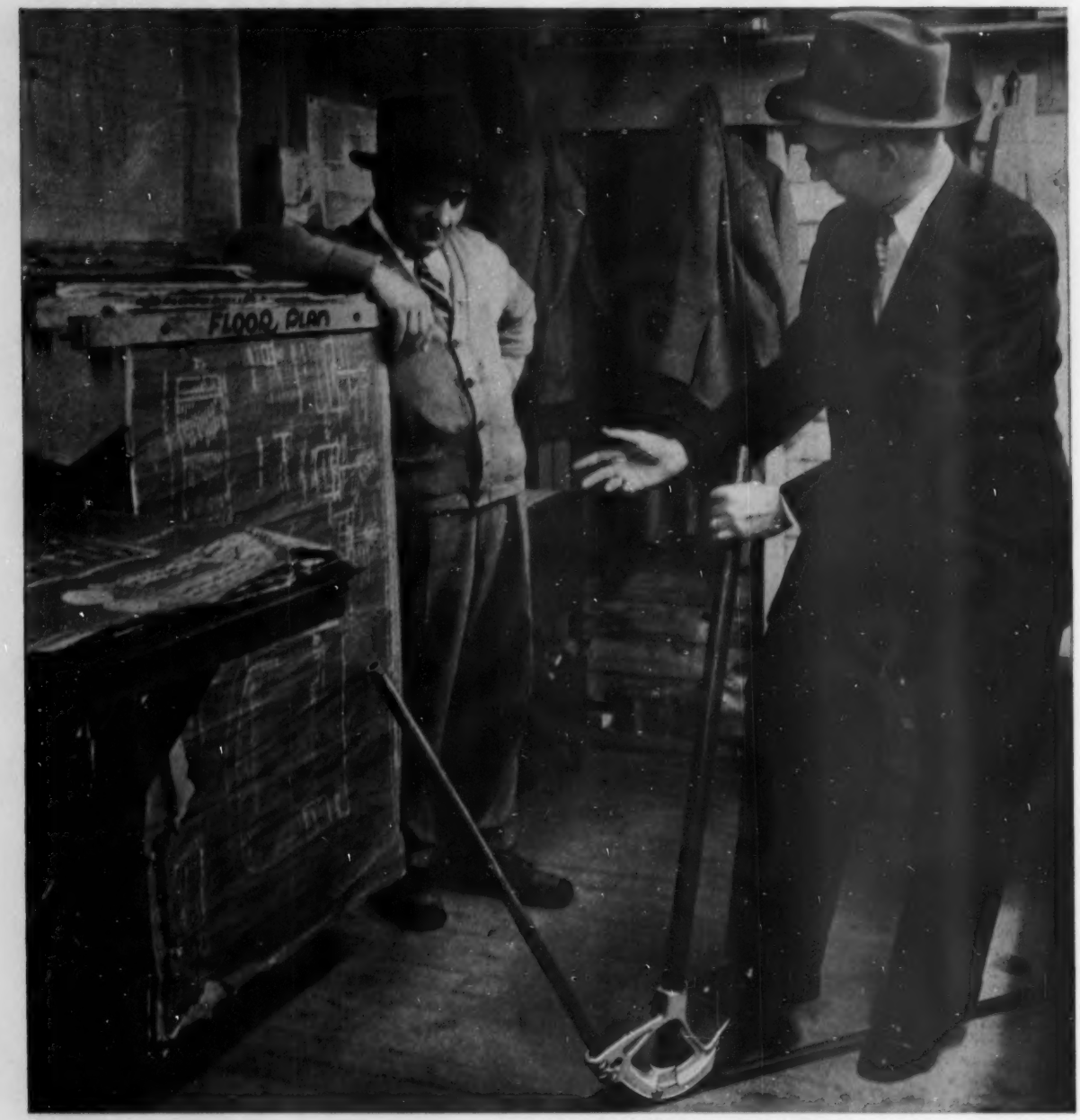
Carol®

NEMA

CAROL CABLE COMPANY

Division of The Crescent Company, Inc., Pawtucket, Rhode Island

• SERVING INDUSTRY FOR OVER 30 YEARS •



Redege Benfield Bender used in demonstration

We had lost the order . . .

then our salesman started bending pipe

We had lost a big order on price—almost. Then our salesman got mad. He decided to *prove* that Sherarduct rigid steel conduit should be specified. So he went out and picked up a bender and some lengths of Sherarduct. Back in the customer's office he started making bends . . . then the customer tried a few himself.

Result: we got the order. The customer didn't need an adding machine to figure out the savings in labor he'd get from Sherarduct's easy bending qualities.

Easy bending is one reason Sherarduct is preferred by so many cost-conscious contractors. There are others, like easy fishing, lifetime protection against corrosion, zinc protected threads, strong couplings and thorough grounding. They're features that add up to why Sherarduct is galvanized conduit at its best.

Next time an NE salesman calls, give him a chance to prove Sherarduct—by actually bending some pipe.

Meantime, write for our Sherarduct facts book and get complete information on the Sherardizing process of dry galvanizing that actually alloys zinc with the steel wall of the conduit.

Sherardizing is galvanizing at its best . . . Sherarduct is galvanized conduit at its best

Listed by Underwriters' Laboratories, Inc.

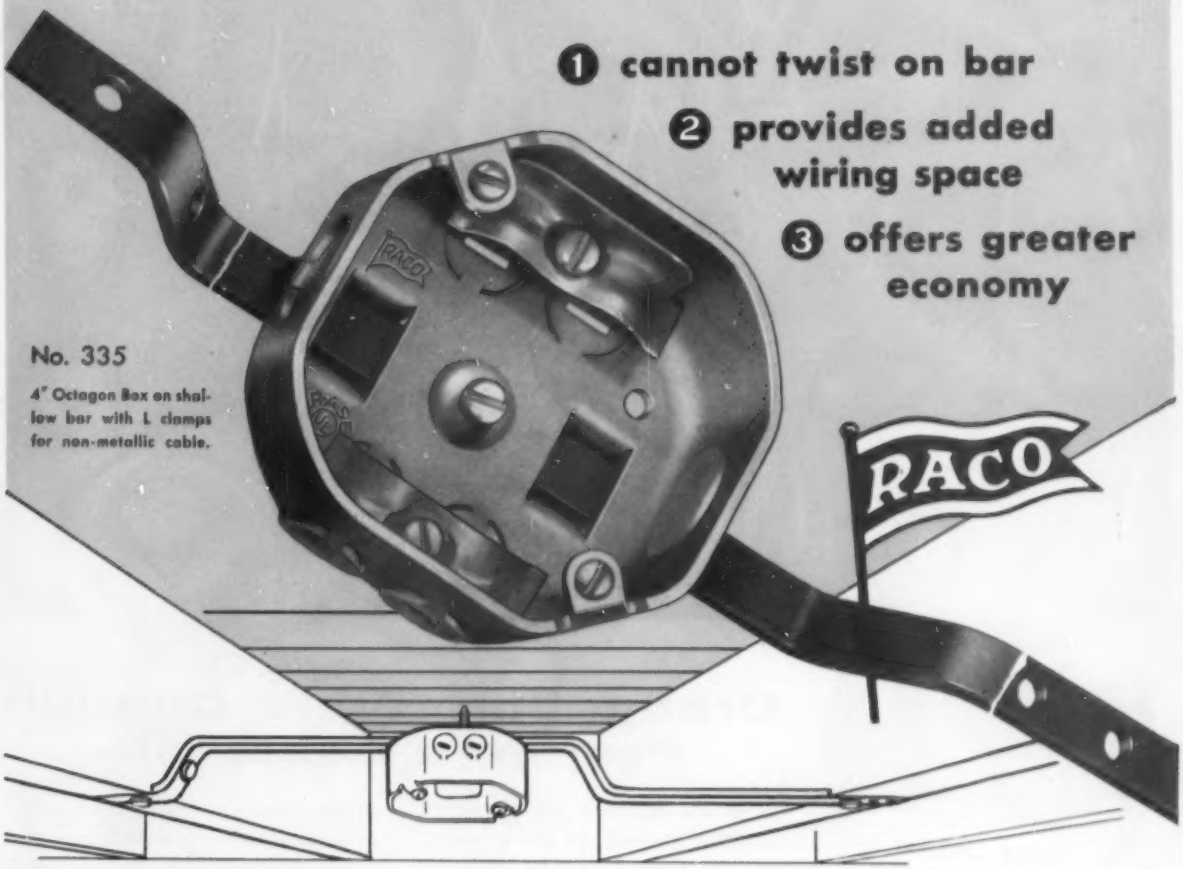
National Electric Products

PITTSBURGH, PA.

3 Plants • 10 Warehouses • 36 Sales Offices

New RACO NO-STUD SET-UP BOX

SAVES TIME • SAVES MONEY on every ceiling installation!



❶ cannot twist on bar

❷ provides added wiring space

❸ offers greater economy

No. 335

4" Octagon Box on shallow bar with L clamps for non-metallic cable.

USE NEW RACO NO-STUD SET-UP BOXES ON ALL THOSE COMPETITIVE JOBS

CEILING FIXTURES · CLOSET LIGHTS · ATTIC LIGHTS
PORCH FIXTURES · BATHROOM LIGHTS · BASEMENT JUNCTION BOXES
AND SIMILAR INSTALLATIONS

You save money both ways with this New Raco No-Stud Set-Up Box . . . lower first cost and lower labor cost on installation. It enables you to make real money on those competitive jobs.

Hardened set-screw with locking point secures box in desired position. Box cannot turn or twist on bar. No stud means more wiring space . . . faster and easier installation.

Two Popular Sizes

3½" OCTAGON

On Shallow offset bar with Raco L clamps for non-metallic cable only.

4" OCTAGON

On Shallow or deep offset bars. Complete with X clamps for metallic cable or L clamp for non-metallic cable.

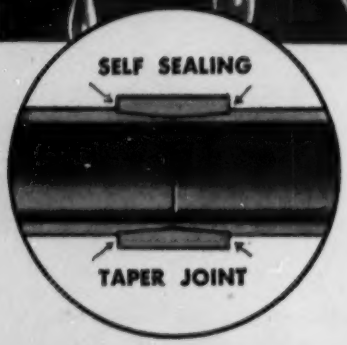
WRITE TODAY . . . GET ALL THE FACTS

ASE RACO

"A RACO BOX FOR EVERY NEED"

ALL-STEEL EQUIPMENT INC. Aurora, Illinois

WATERTIGHT!



Orangeburg Fibre Conduit Prolongs Cable Life

Keep out corrosive ground waters, and you prolong the life of underground cables, say utility engineers!

Why? Because ground waters containing corrosive elements derived from the soil and concrete encasement attack cable sheath and shorten cable life. Orangeburg's impermeable wall and self-sealing Taper-Sleeve Joint shed them *"like water off a duck's back."* You get maximum protection with Orangeburg.

Orangeburg protects cables in many other ways. Smooth bore, low co-efficient of friction reduce incidence of abrasion. Its material is strong, tough, resilient, durable.

No other conduit is easier to install

Light, 8-foot lengths and a complete line of bends and fittings speed installation. Taper-Sleeve Joints tap water-tight in a jiffy. Orangeburg lays faster and at lower cost than any other type of conduit.

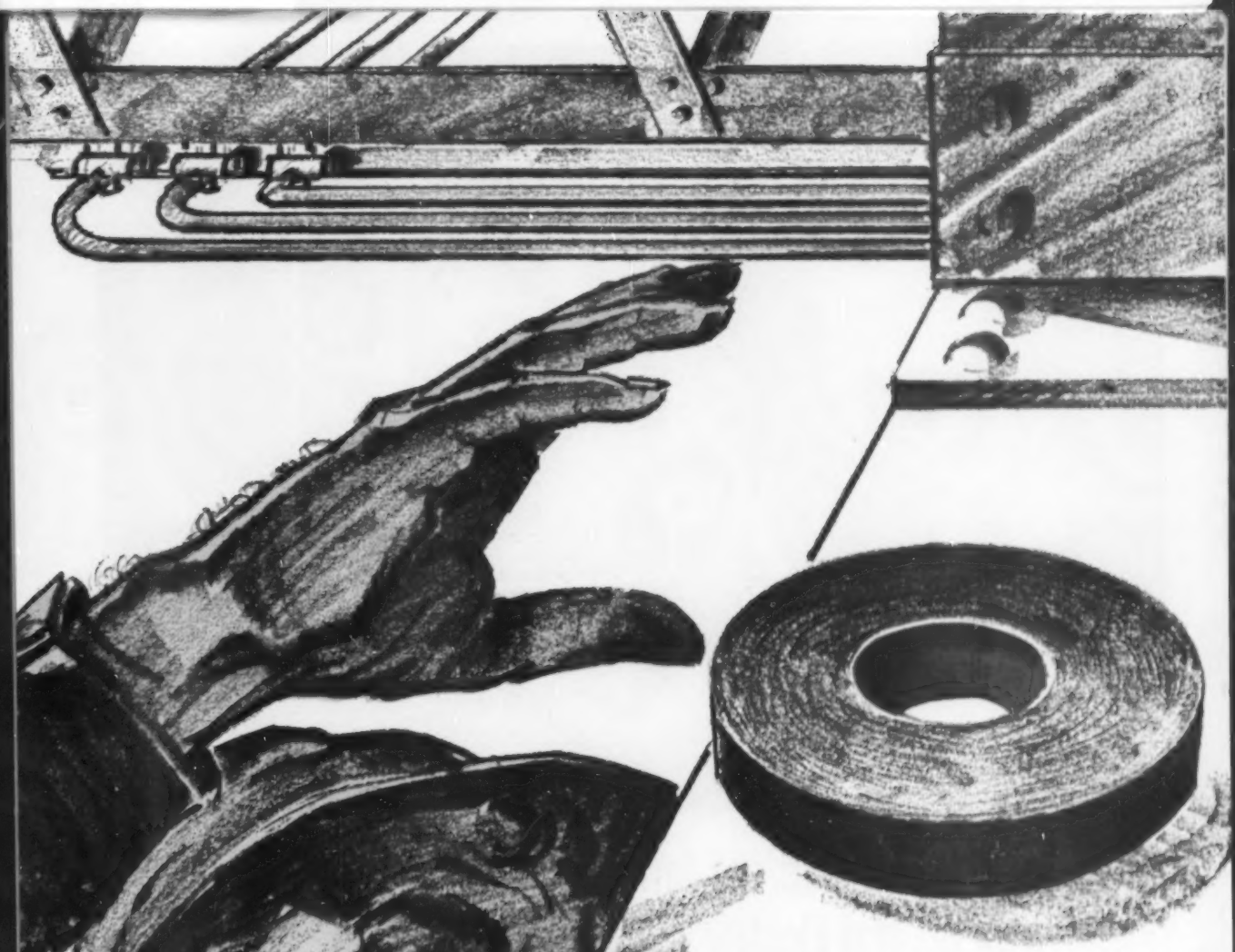
Orangeburg Fibre Conduit has prolonged cable life at minimum expense for utilities, municipalities and industry since 1893.

Distributed by Graybar Electric Company and by General Electric Supply Company. Branches and stocks in principal cities.

WRITE DEPT. ES-116 FOR CAT. 52

ORANGEBURG MANUFACTURING CO., INC., Orangeburg, N. Y. **West Coast Plant, Newark, Calif.**

ORANGEBURG®
FIBRE CONDUIT



He's reaching for...

the **BEST ELECTRICAL TAPE...**

ACCURATE TAPE

FRICTION, RUBBER SPLICING, and PLASTIC TAPES

ACCURATE MANUFACTURING COMPANY
Garfield, New Jersey

LARGEST EXCLUSIVE MANUFACTURER OF ELECTRICAL TAPE

Now you need only half the former space with General Electric's new 30 amp, 600 volt HCI safety switch!

This HCI safety switch, both heavy and standard duty, has a new compact design measuring only 7⅜" wide x 9¾" high x 5¾" deep! In less than half the former space, you get the same dependable protection and these important benefits:

Long life, dependable performance. G-E arc quenchers quickly divide and snuff out arcs, help prevent pitting and burning of contacts. Heavy steel box has Bonderite† corrosion-resistant finish and butt-hinged door for rugged durability.

Speedy installation and maintenance. Front operated handle makes close ganging easy with the heavy duty model; front fusing on both models means fast access to fuses, efficient heat dispersal. Double-break HCI pole units can be individually replaced.

Better protection, greater safety. Quick-make, quick-break contacts can't be teased in or out. Switch handle locks OFF or ON. When switch door is open, special line shield on heavy duty model guards operator against accidental contact with live parts. *General Electric Company, Circuit Protective Devices Department, Plainville, Conn.*

Use these catalog numbers to order 30 amp, 600 volt HCI switches from your G-E Distributor:

Type H, heavy duty, front operated, 3 pole*		Type S, standard duty, side operated, 3 pole*	
Fusible	No fuse	Fusible	No fuse
TC90361SD	TC45361SD	TC60361	TC30361

†Parker Rust Proof Co. *UL listed

GENERAL ELECTRIC

FRICTION, RUBBER SPLICING,
and PLASTIC TAPES

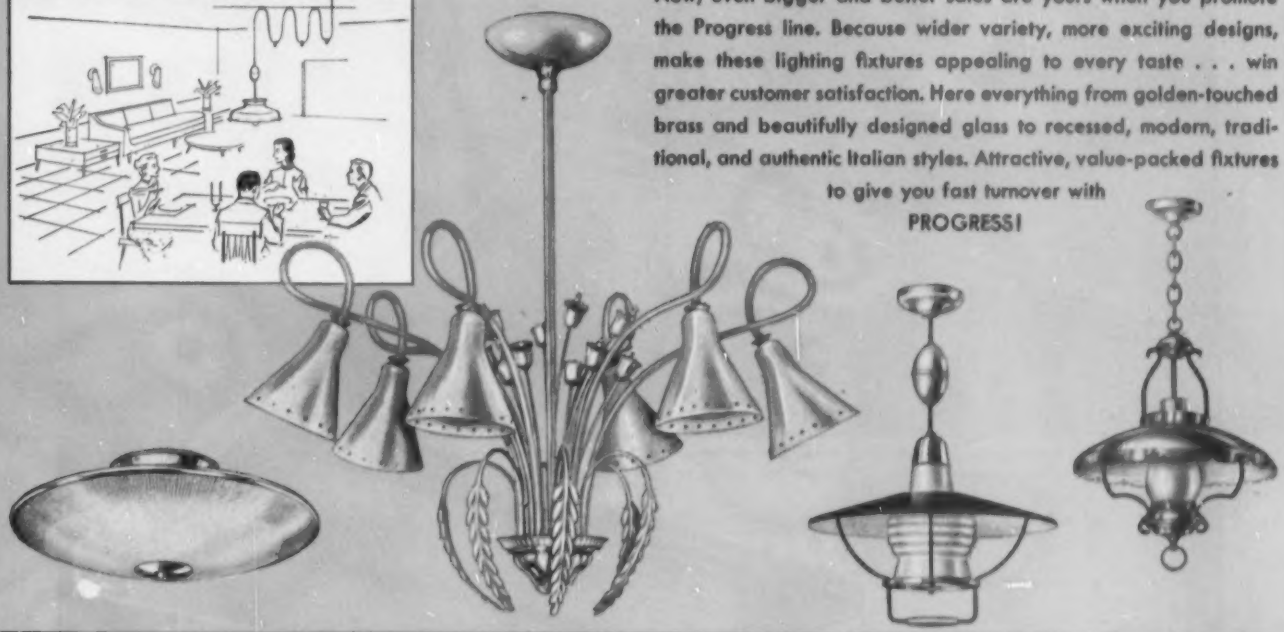
ACCURATE MANUFACTURING COMPANY
Garfield, New Jersey
LARGEST EXCLUSIVE MANUFACTURER OF ELECTRICAL TAPE

NEW! NEW! NEW!

progress

...the word for everything at...

America's Fastest-Selling Line of Lighting Fixtures



Now, even bigger and better sales are yours when you promote the Progress line. Because wider variety, more exciting designs, make these lighting fixtures appealing to every taste . . . win greater customer satisfaction. Here everything from golden-touched brass and beautifully designed glass to recessed, modern, traditional, and authentic Italian styles. Attractive, value-packed fixtures to give you fast turnover with PROGRESS!

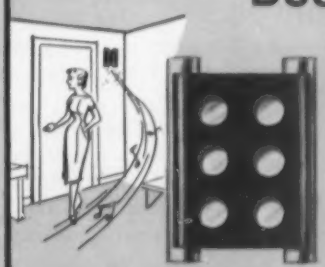
NEW!

Power Vent Ventilating
Fans and Range Hoods

Every item in this sensational new line represents more-for-the-money value! Fine styling and top performance by PROGRESS—a name your customers recognize for quality in lighting fixtures—insure fast selling action. Why PROGRESS means better business for you!

NEW!

Beautiful
Door Chimes



Handsomely styled, they include Hi Fidelity chimes in bone white or brass, as well as recessed electric chimes. Also repeating chimes in wood, copper, brass and other special finishes. Feature them—for a real sales-plus!

PROGRESS MANUFACTURING CO.
PHILADELPHIA 34, PA.

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☐ Lighting Fixtures ☐ POWER VENT Ventilating Fans and Range Hoods
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TROFFER LIGHTING PATTERNS —
without
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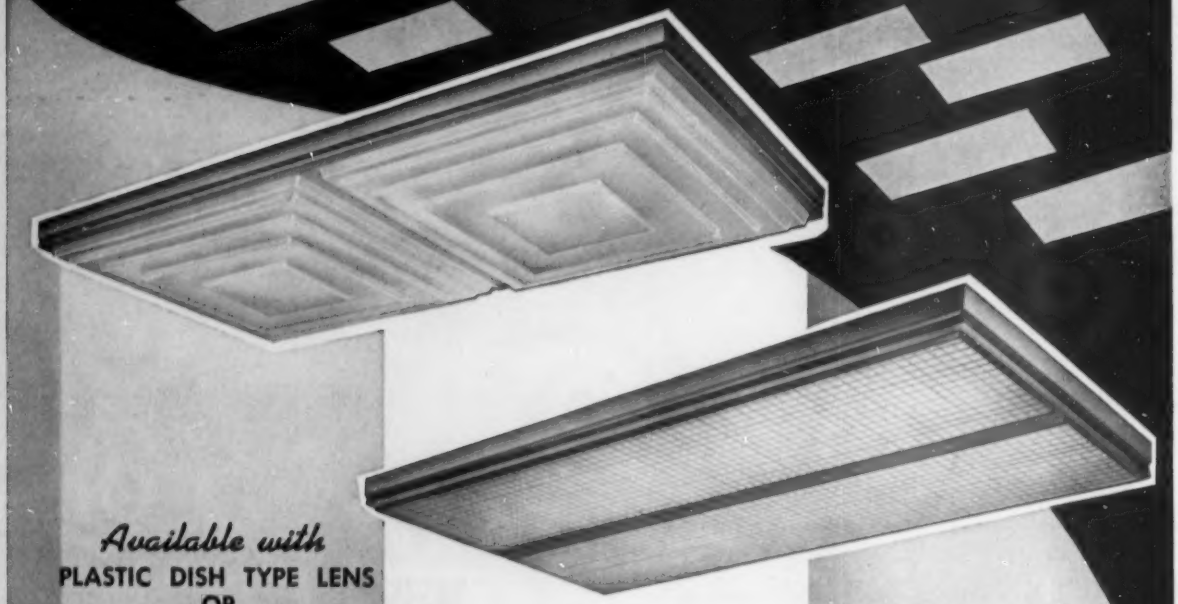

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OR
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or
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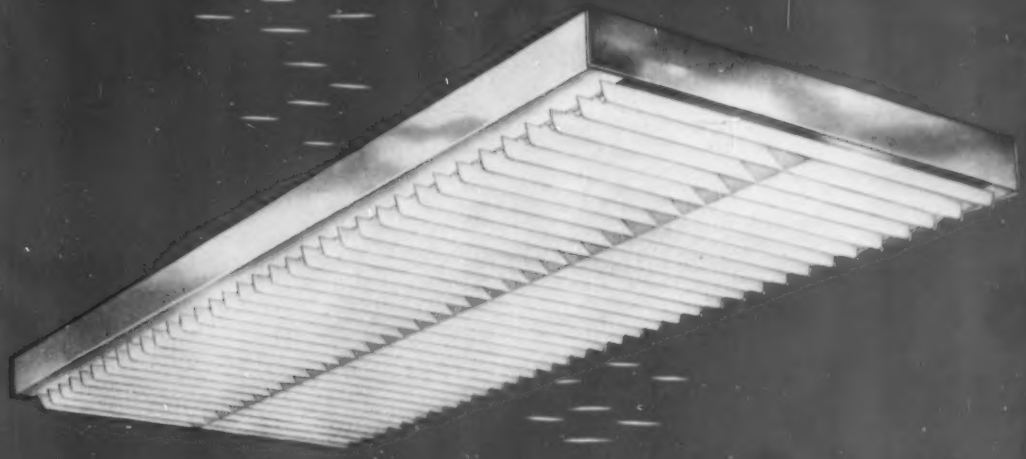

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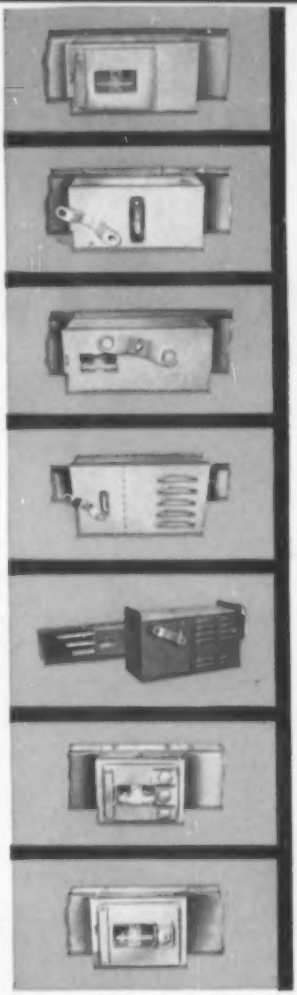

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BullDog Bus Plugs for Plug-In Duct meet a full range of applications, perform with top efficiency and safety. Seven plugs are available—from types which tap power instantly from the duct to types which provide constant safety checks on its operation.

The seven BullDog Plugs—BP, Vacu-Break®, Circuit-Breaker, Capacitor, Transformer, Ground Detector, and Temperature Indicating—are all safety engineered.

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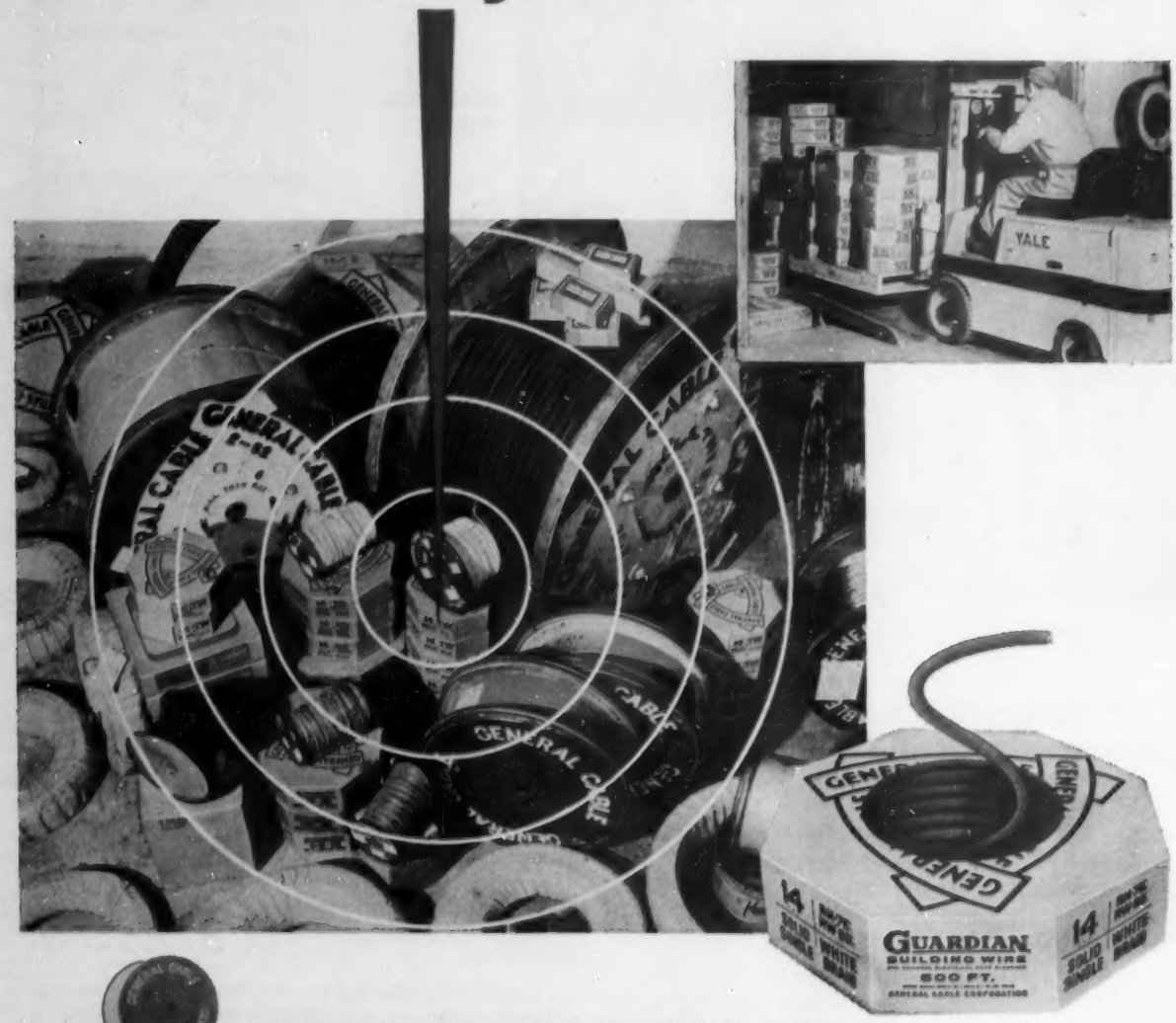

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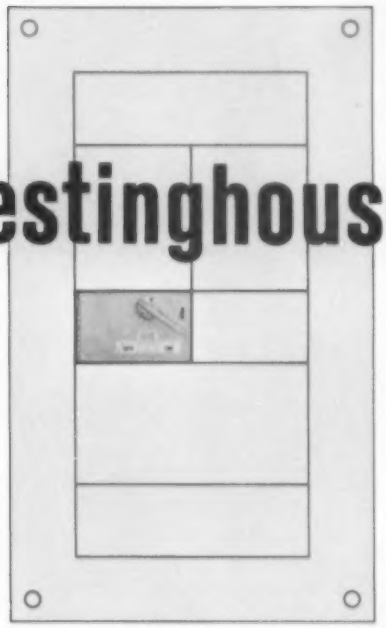
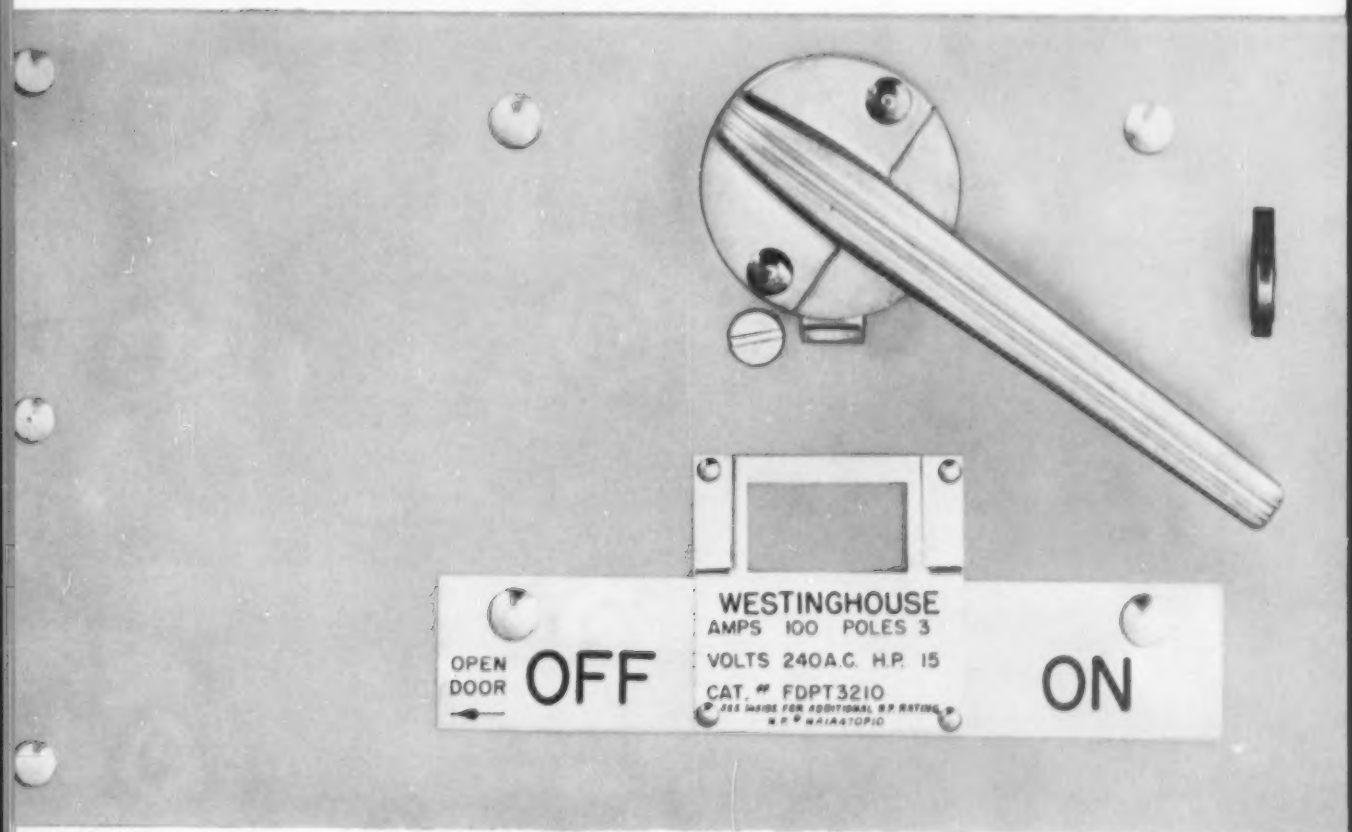


Industry's First De-ion® Fusible Distribution Panelboard

...the Life-Line FDP



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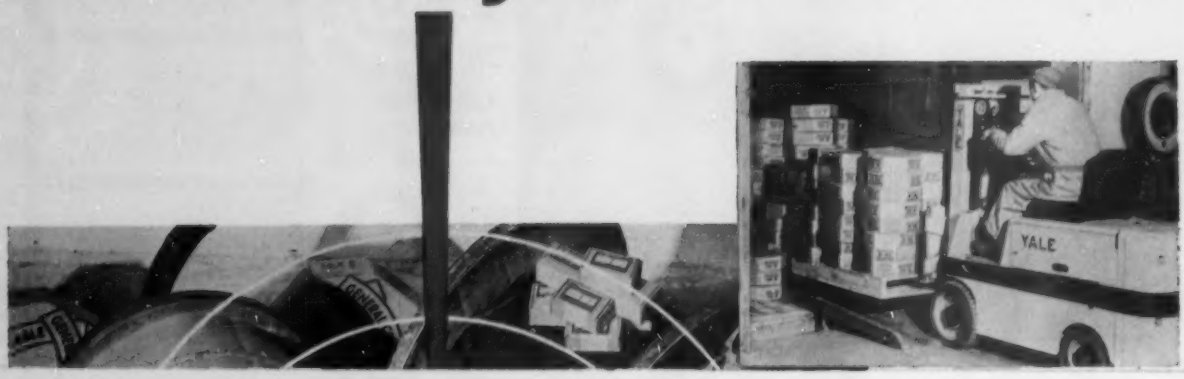
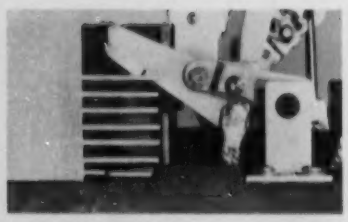
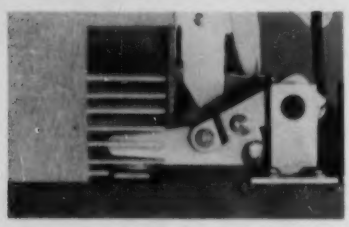


A panelboard equipped to meet your most demanding requirements

. . . Because It Has a Switching Mechanism That Incorporates . . .





Quick-make, quick-break
You get fast, safe action. The switch in the new Life-Line FDP uses an over-center, spring-operated toggle device with a sturdy crossbar to completely eliminate the possibility of teasing.

De-ion arc quenchers
The exclusive Westinghouse principle of arc extinction provides a fast, positive method of breaking hot arcs. De-ion grids confine, divide, and extinguish arcs quickly and safely.

Visible blades
Positive indication of whether contacts are in open or closed position. You see the switch blades at a glance—no guesswork.

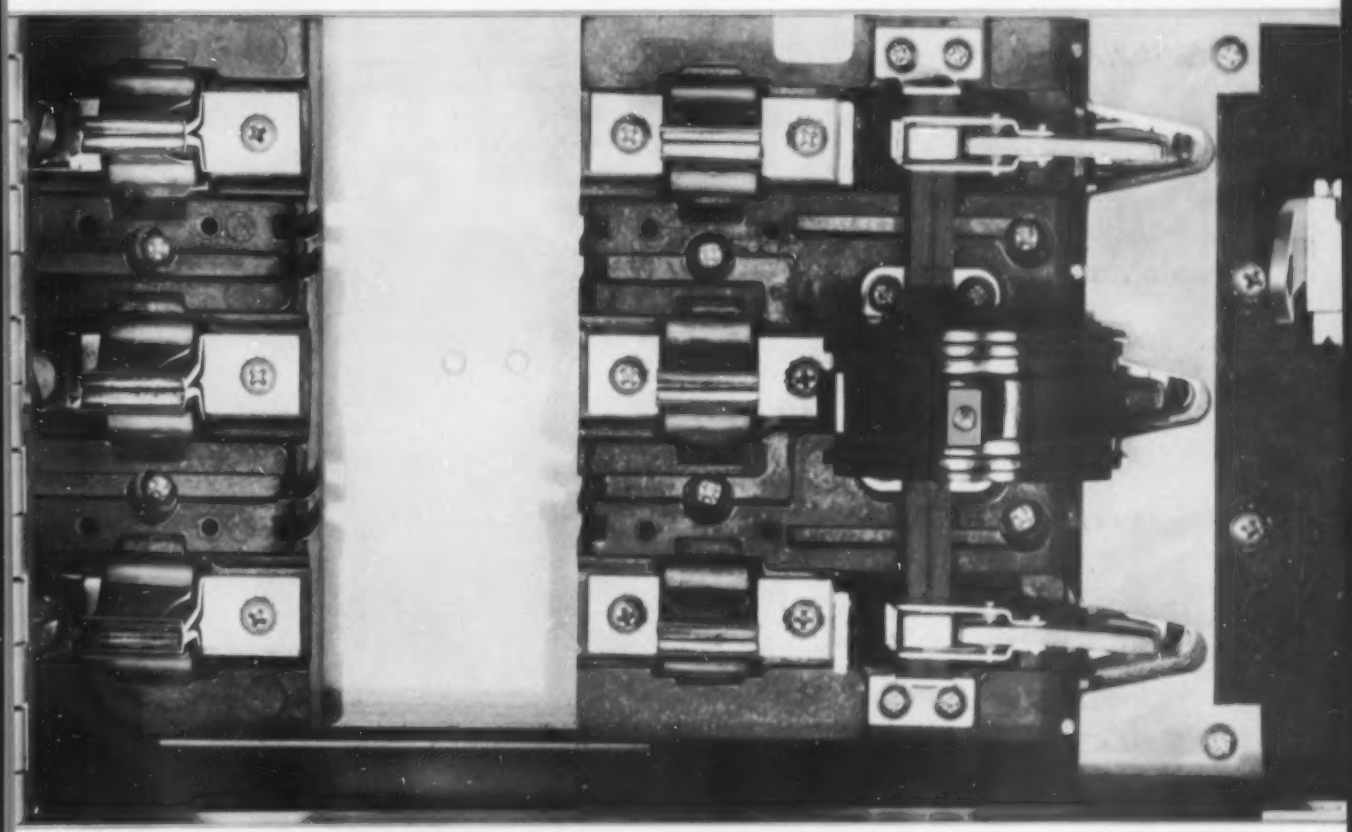
The only fusible distribution panelboard that combines these three outstanding advantages...

be specific . . . **specify GENERAL CABLE**

NEW from Westinghouse

Industry's First De-ion® Fusible Distribution Panelboard

...the *Life-Line FDP*



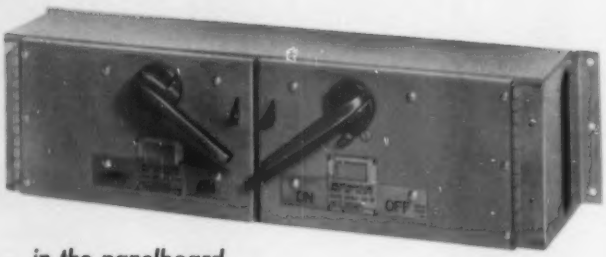
YOU CAN BE **SURE**...IF IT'S Westinghouse

Check these advantages of the new

Life-Line FDP PANELBOARD...

in the switch . . .

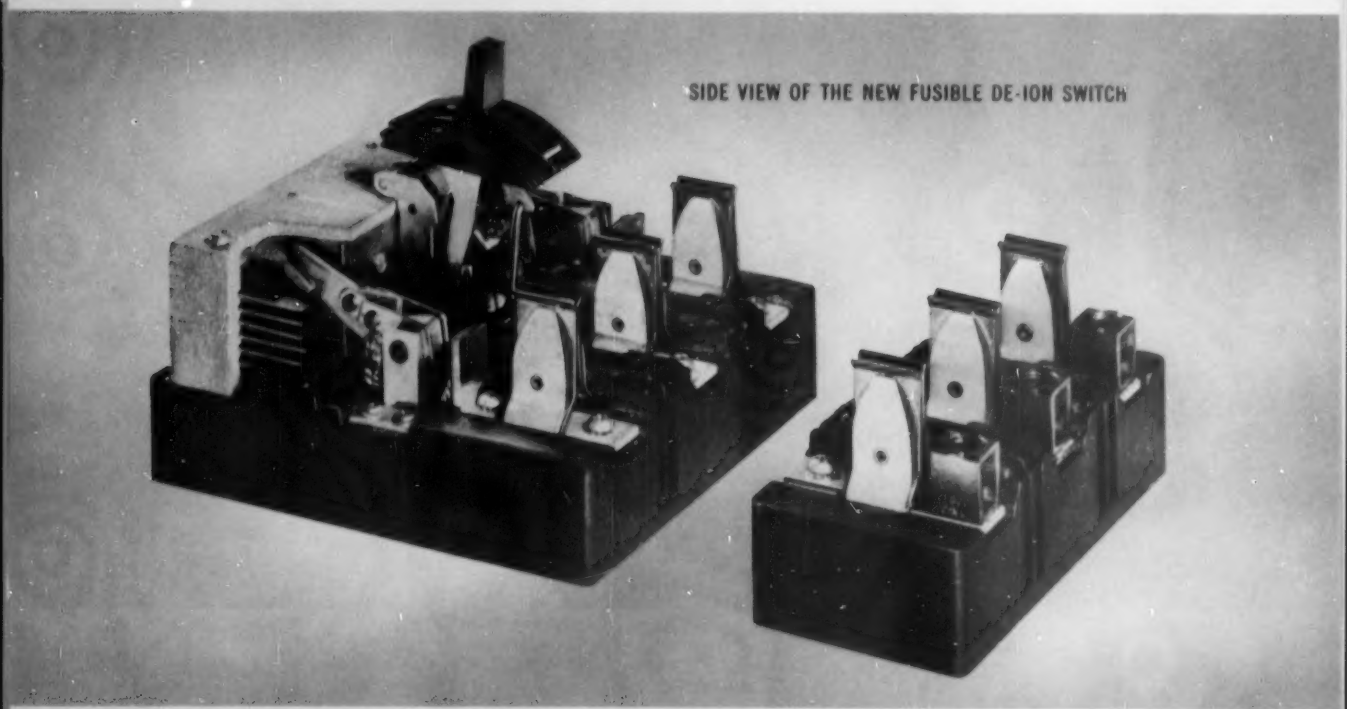
- Quick-make, quick-break switching mechanism
- Visible blades
- Switching mechanism provided with De-ion principle of arc extinction
- Silver-alloy switching contacts
- Solderless connectors
- Reinforced fuse clips
- Externally operated handle for each switch
- Horsepower rated switches
- Provision for locking switches in "on" or "off" position
- Provision for circuit identification at each switch
- Access door over fuse compartment interlocked for safety



DOUBLE-DOOR UNIT

in the panelboard . . .

- Ample wiring and gutter space
- Space for future units can be provided
- Suitable for wall mounting
- Standardized enclosures
- Maximum convertibility
- Extended neutral bar



SIDE VIEW OF THE NEW FUSIBLE DE-ION SWITCH

YOU CAN BE SURE...IF IT'S Westinghouse

J-93529

Hawthorn Kiddie Corner, Wheaton, Illinois.

"Virden's new slimline fixture paid off here ...got us the job...made us a profit, too."

Reports Tom Gibson, Gibson Electric Co., Inc., Chicago, Illinois

"Competition was tough on this Wheaton, Illinois job, but your new slimline fixtures helped us get it", writes Mr. Gibson. "First it gave us high quality at a low price and second, we knew we'd save on labor costs because your fixtures are easier to install."

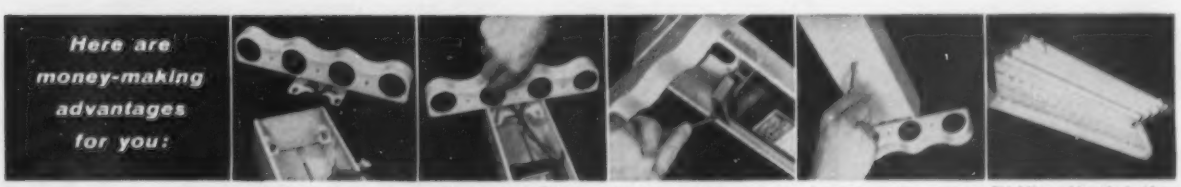
Twin advantages that added up to profits for Gibson Electric Co. . . . can do the same for you.

For Virden's new slimline fixtures are *high* quality, through and through. Accurately made, from heavier gauge steel, you get a better looking job. They fit true, keep long runs straight.

These new fixtures cut on-the-job assembly time too, *as much as two-thirds*. All screws are pre-set. Parts fit together with a snap, lock tight with a simple twist of a screw driver. The louvered or plastic shielding, when used, is hinged on both sides, for easy cleaning or relamping.

These advantages cost no more! Let Virden's new slimline fixtures earn profits for you. Your Virden distributor has them in all standard lengths and sizes. Order now, *John C. Virden Company, Dept. ES-11, 6103 Longfellow Avenue, Cleveland 3, Ohio.*

decorative lighting by virden


Here are money-making advantages for you:
All screws are pre-set.
Slip sockets on. Tighten.
To change ballast, snap out.
A quarter turn locks cover.
Shield hinged from both sides.

SHOPPING CENTER

Contractors wiring neighborhood shopping centers are encountering some special problems introduced by the speed-ups and competitive situations involved. Biggest need from electrical contractor's viewpoint is sound design and reasonable completion deadline in order to permit more efficient organization of the work.

By Hal Newsome, Field Editor, Electrical South, Miami, Fla.

◆ THE RAPID, continuous construction of large "neighborhood" shopping centers in the outlying areas of most cities is posing new problems for the electrical designer and contractor.

There are over 100 of these developments in Greater Miami and Dade County with a minimum of 5 or 6 stores — and around 25 larger ones costing several million dollars and up. This multiple-store trend is being speeded up in many states by the modern retailing facilities offered, and by the ready traffic access and ample parking space provided.

While some city planners fear this rapid expansion may be overdone, and will decrease realty values and tax revenues on older central business areas, many designers and electrical contractors see it as the immediate future pattern for most large store installations on new work.

The big jobs, on 5-to-10 million dollar developments — with electrical contracts running 10% — are limited to sizeable firms. But there are lots of small to medium centers going up all the time which are open to all.

Building rush

These "centers" are mostly put up by promoters who sell them to long-term real-estate investors, and neither can get any return on their large investments until the buildings are ready for rental. Hence there is usually a big rush on both designs and bids and a very close time limit on the contracts, which greatly aggravates the material-delivery and personnel problems of electrical contractors. It also often prevents efficient pre-installation planning and spacing of the subcontracts, and boosts costs unnecessarily.

Some of the centers are very well built with top-quality design, materials, and workmanship in the electrical systems. However the tendency of many developers, who are themselves under financial pressure, is to build to a speculative price and eventually sacrifice quality to some extent in one way or another.

Centers in the same cities are often sharply competitive with each other in attracting branches of large national chain stores by offering "favorable" rental prices. This helps to set up a tight electrical budget from the beginning. When this threatens to be exceeded, especially in cases of hurried design and sketchy job planning, the temptation to make "substitutions" and take short cuts somewhere along the line is often great.

Sometimes *one* part of the job is well done—such as the basic distribution, or the system in one "key" store whose name is used to sell the project—and then other areas or equipment such as circuit breakers and fixtures are

somewhat skimped, or left for the tenants to complete.

The projects, in informed engineering opinion, vary widely in the quality and reserve capacity of electrical materials and equipment, in safety and flexibility for future use, and in durability and ease of maintenance—all largely because of owners' pressure on engineers and contractors. The latter make their own "designs" in some cases on the less pretentious jobs.

These highly-publicized contracts are eagerly bid because of their size, and the prestige and advertising gained. However, it is reliably stated that contractors have not made adequate profits on many of the jobs, and some have had a struggle to break even. They say that the "close" bids required on some jobs are tough to begin with, but that the short deadlines, almost universally demanded, cause excessive waste of materials and time.

The difficulty, especially, of getting large numbers of all-around competent electricians to speed up jobs—and of supervising up to 100 men efficiently—makes it very costly. This is even harder without a top-notch design and work layout. And in some cases only the "extras," on later wiring changes made directly for the individual stores, have enabled contractors to come out in the black.

Some engineering firms are now checking these jobs carefully before they undertake to make a design. They pass up the cut-rate plans and quickie jobs that have not set up an adequate budget and standard of quality. The prospects of excessive maintenance and eventual rebuilding of these installations leads them to feel the work will not be satisfactory.

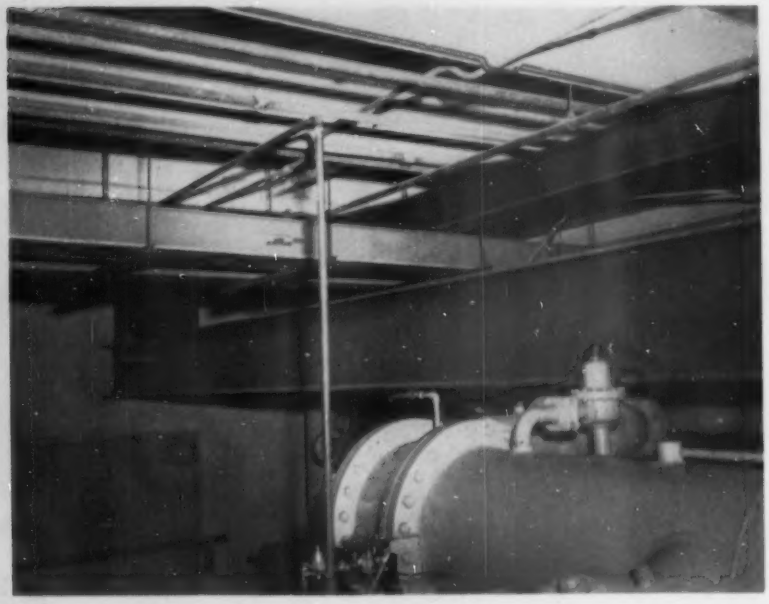
New Miami center

In sharp contrast to the above picture, there are some developers in every area who have done creditable jobs on projects which continue to give good service to investors and tenants. In Miami, the Biscayne Plaza Shopping Center at N.E. 79th Street is typical in many ways of the best type of design and installation. It is a fairly recent job and still the largest multiple-store development in actual operation in the area, and perhaps in the South. The plant covers 20 acres, provides 36 large stores and 100,000 sq. ft. of second-story office space, with parking for 1700 cars.

The electrical installation, put in by B. & W. Electric of Miami, is considered one of the best. Hal Silvers, head of B. & W., supervised the job, Len Glazer of Sasnett Engineering, Miami, made the electrical design, and John Sasnett designed the air conditioning. Most of the 2,000 fixtures were supplied by U. S. Distributing Co., Miami, who will also furnish another 1,000 units for building #3.

The electrical contract ran about $500,000, and provided such quality features as: top-grade wiring materials and equipment, dual primary underground feeders, individual transformer vaults for each of the three large buildings, meter sockets incorporated directly in the switch gear, high-grade air circuit breakers, 2,000 feet of underground cable, 6,000 feet of underfloor distribution and ample bus duct distribution in service lines.

Free-standing switch boards were used throughout with motor control centers and breaker panels. Incorporating the meters directly in the switch gear produced a neater job and saved enough space to permit smaller and uncluttered meter rooms — with



Typical of the problems encountered in wiring neighborhood shopping centers is the installation of this ventilated bus duct in an area with "no room to spare."

every square foot of the building having rental value. The switch gear came ready bussed from the factory which saved labor cost.

Wiring set-up

This installation was the first local job to use an overhead 3-phase, 4-wire "star" system (wye) with no high leg. This supplies an extra hot leg on the same neutral, reduces the voltage and provides a 4-wire system for branch circuits instead of a 2-wire set-up. The Miami code does not permit the use of a common neutral in single-phase work, so the above system was used instead—an instance of good power company cooperation, through Glen Eaton, local representative on this job.

With 6,000 kva provided for the three buildings, and oversize distribution lines, the system provides a 20-30 per cent reserve for increased future loads. One building has two 1,000-kva transformers, and the other two buildings have three 500-kva transformers apiece. There is also space for an additional unit to provide 500-1,000 more kva.

On the 20-acre layout, the long feeder runs were overcome by the centralized distribution in each building, and voltage drops were avoided by underground lines of special low-impedance duct. Also the power company made a special point of supplying "full" voltage in this heavily-loaded area.

Adequate flexibility is provided at the separate panels to switch more of the load to those stores requiring it through 1½- and 2-inch conduit "loop" circuits run between lighting panels for this purpose.

The dual primaries are equipped with an RAD manual switch to transfer service in an emergency. The owners approved the dual system when informed that it would take from three days to a week to restore service in case of a breakdown of the primaries to the vaults.

For the entrance the power company came in with an overhead 13.2 kv primary stepped down through the 3-phase transformers. The secondary voltage is handled through a 120-208 v 3-phase, 4-wire wye, and the secondary bussing in the vault consisted of ¼ by 4 inch copper bus duct mounted on steel racks. From there three-phase, four-wire duct feeds the switch gear. About 550 feet of 2500-amp duct was used with the longest single run about 300 feet.

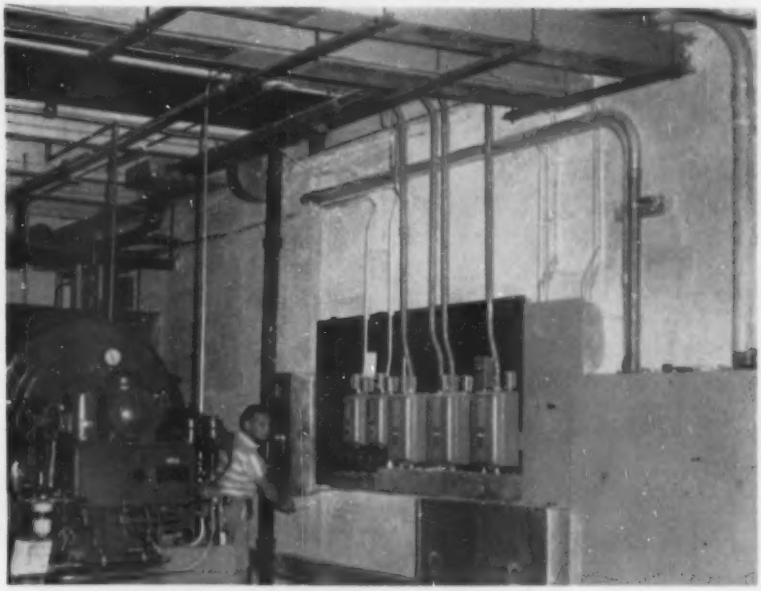
In building #1, to overcome the distance, designers used 3-phase 4-wire half-neutral low-impedance busway to feed the sub-distribution centers. In buildings #2 and #3, to permit greater flexibility in second-floor office areas, underfloor duct was employed both for telephone and power-light needs.

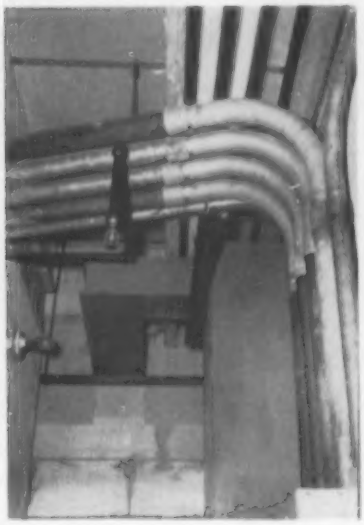
Underfloor duct used

The second floor is of 2½ inch slab construction and 1½ inch duct was used here. The space between two selected joists was left open during the initial "pour"; then with duct set in place the floor was poured to the specified thickness. Besides the neatness of concealed wiring, the chief advantage of underfloor feeders is that the service can be brought up later to any point in any office when it is needed. Underfloor lines are routine for modern office buildings but not all shopping centers go to this expense. The offices all have double switches, one at each door.

The time factor was very important on the whole electrical installation, with only four months and ten days allowed for this large and complex job. Sixty electricians were kept busy on the average and toward the end as many as 120 were used, making the efficient layout and supervision of work difficult.

The buildings went up so rapidly it was impossible to get all the transmission lines in at the most favorable times. Consequently several walls and ceilings had to be broken into and some small exterior space had to be built on to





At left, a section of the compressor room showing off-peak controls. At right, the construction problem was getting a large amount of conduit into this tight space.

house equipment. Sewage and utility lines had been put in first in an interior street and the electrical transmission lines had to go down 6½ feet to cross under them —one of the problems the contractor had to meet which increased his cost.

Due to the rush and to a personnel change in the engineering firm, pre-planning on the whole job could have been improved to save man hours, and many problems had to be worked out on the spot by the contractor in consultation with the owners, the new engineer, the inspector, the power company and the general contractor. Good personal relations and a spirit of co-operation helped bridge the gaps; but all the principals realize that if time had been taken for better planning and coordination at the beginning, a great deal of labor cost could have been saved. A lot of overtime work cut into the contractor's profits and too many conflicting jobs were going on at the same time.

Material delivery problems

Material deliveries for a job of this size, and for 60-100 electricians, presented acute problems. Except for fixtures, most of the material and equipment was supplied by one wholesaler, which often made 5 or 6 deliveries a day in a special truck set aside exclusively for this job. Some material was sent from the factory by air parcel post and air express at no extra cost to the general contractor, and on one occasion a carload and a half of conduit was delivered three days after the order was placed.

B. & W. Electric had a private office and telephone on the job and Hal Silvers and his supervisor, Walt Little, sometimes worked around the clock. Much of the wiring was done at night to catch up on other trades. Ten-foot sections of bus duct weighing 660 pounds had to be installed with chain hoists after the partitions were up. A complete three-section window was removed to set equipment for the air-condition control center in place with a crane.

The electrical contractor set up his own shop on the grounds and used power tools wherever possible, even for pulling wire. These included hydraulic benders for tube and conduit, and also a table bender, two power vises, a motorized wire puller and trenching machines.

The owners supplied 1,000 square feet of storage space and the contractor maintained a complete stock room with a standard inventory of material—never less than $10,000 worth. This stock was larger than that of some supply stores, and a regular inventory-control system was employed to keep it up to date. The job steward checked out all special tools and was responsible for their return. The shop men cut and threaded all nipples and every odd length of conduit was saved for this purpose. Still there was a lot of waste in materials mostly due to the speed up.

The installation has a high safety rating. All receptacles are of the grounded type, and the air circuit breakers with proper interrupting capacity, running from 1200 to 1600 amps, were used in preference to lower capacity fused switches employed in many "centers." The circuit breakers are considered to give safer and more flexible control and save on maintenance cost. Special plug-in molding was used around the perimeter of one store to demonstrate appliances at any desired point.

Lighting features

The individual stores carried out their own ideas about lighting. D. L. Garbett, of U. S. Distributing Co., said that most of the fixtures are standard units, with 90 per cent of the inside lights being fluorescent. Incandescent units are used for "accent" lighting of special displays both in windows and inside stores, and in conjunction with fluorescent for correct color values on clothing in some stores.

Hal Silvers, B & W Electric, Miami, inspects first local meter assembly installed directly in the switchgear to save space. At right, a 3,000-amp bus-duct cable tap-box feeding individual store.

For the under-canopy lighting of walk-ways in front of stores designers employed 400 150-watt, recessed Atlas incandescent units, which resist weather and moisture. Lamps are located 15 feet apart and nothing is exposed but the glass surfaces. Store-front signs are of standard neon type.

About a dozen standard types of fluorescent fixtures were chosen for store ceilings, with fluorescent being preferred for routine illumination because, the supplier said, it is about 10 per cent cheaper to install and saves about one third in current cost. Engineers say that it is important to obtain "full" voltage with fluorescent systems in order to avoid ballast trouble. Care should also be taken to store this equipment where the transformers will not absorb moisture.

A rather novel 12-bulb, 8-ft.-square slim-line ceiling fixture was used in the J. C. Penney store. This was of the open-end-socket type, very decorative and affording a big spread of light. Other heavy slim-line ceiling fixtures measured 4 by 16-ft. with six transformers in each 16-ft. unit serving the 12 lamps. These units had to be lifted into position in sections.

Office corridors on the second floor are lighted by continuous single-tube, slim-line, semi-round units, one run being about 250 feet long and straight as a string.

The original design allowed for 10 watts per square foot of tentative illumination to determine the approximate load and feeder requirements. In most places this "cushion" was ample, but for some ground floor stores it was necessary to pick up additional current from second-floor panels through the loop circuits. The big corner restaurant later added a bake shop and 40 tons of air conditioning to require more current, and an additional feeder was run in over the roof to supply it. Adequate reserve for air conditioning is something engineers always recommend but sometimes don't get in *all* areas.

In planning the first shopping centers, few owners realized how important good outside lighting would become in the huge parking areas for late evening shoppers and for general decorative and "selling" aid. Thus many of the projects are still deficient in this respect.

Most effective lighting

The most effective illumination for this purpose is now considered to be provided by either good all-weather slim-line perimeter lighting, or by equally spaced rows of standard incandescent flood lights on 100-ft centers—lowest operating costs are obtained by the use of 400-watt color-corrected mercury vapor units 30 feet above the ground and on 85- or 100-ft. centers.

All these designs permit accurate calculation of the lighting level, and the latter at least provides illumination equal to the best street lighting with a very adequate average of two foot-candles—varying from 1.6 to 3 according to the exact position tested. For lowest maintenance cost, aluminum poles with decorative mast arms are preferred, and enclosed luminaires are good. However, wooden poles are satisfactory and the important consideration is to supply a sufficient *number* of efficient lighting units to do the job.

The Biscayne Plaza parking space has standard floodlights on six steel poles spotted about every 200 feet mostly through the center of the area. These twin units provide 3,000 watts at each pole and 18,000 watts for the six acres. Engineers now consider that more units in a closer spacing would be

Continued on page 135)

1957 Farm Power Use Calendar aids in planning sales program

The Farm Power Use Calendar, designed to help the farmer gain greater efficiency and production through use of electricity, suggests promotion of certain electrical equipment during certain months.

◆ 'AN EXPANDED Farm Power Use Calendar, emphasizing electrical equipment to help the farmer gain greater efficiency and productivity, has been announced for 1957 by the Inter-Industry Farm Electric Utilization Council, representing rural electric cooperatives and electric utility companies.

The calendar suggests the promotion of certain electrical appliances and farm equipment during certain months. It is designed for the use of agricultural and educational agencies in planning farm power use programs and for manufacturers and power suppliers in planning sales programs for 1957. It is the work of a joint committee representing the Edison Electric Institute, National Association of Domestic and Farm Pump Manufacturers, National Electrical Manufacturers Association, National Rural Electric Cooperative Association, and the Rural Electrification Administration.

The 1957 Calendar lists 10 farm production items and eight household appliances. This compares with four farm production equipment items and four household appliances in the current calendar.

Calendar objectives

The Inter-Industry Council believes that the enlarged Calendar will encourage a greater number of equipment manufacturers and distributors to join power suppliers and farm service organizations in local power use projects. These will provide wider opportunities for farmers to learn about and appraise newer types of electric-powered equipment.

Objective of inter-industry power use activities is to help farmers attain economic stability and financial betterment for themselves through the planned utilization of economical electrical power. The Calendar aids in this by giving the electric industry a time-table based on farmers' needs and interests. It shows the months when major emphasis should be given each of the 18 items listed.

Background on calendar

The 1957 Farm Power Use Calendar recognizes two major developments: (1) Farmers are ready to accept proven electrical production equipment to increase productivity and cut costs; and (2) a vast and growing market awaits manufacturers, distributors and dealers who are alert to the electrical sales opportunities of the day.

The Council and co-sponsoring groups have chosen the 18 items, principally on their value and usefulness to farms. By getting the industry to expand and coordinate its own promotional activities, the Council hopes to aid the farmer to speed up the conversion to more efficient and economical farming methods and equipment. Correspondingly, the Inter-Industry effort should also broaden the market for manufacturers and distributors.

Benefits for farmers

Proper utilization of the electrical equipment listed on the 1957 Power Use Calendar can greatly benefit the farmer. First of all, these modern devices reduce labor

(Continued on page 136)

The 1957 Farm Power Use Calendar, announced by the Inter-Industry Farm Electric Utilization Council, is for use of manufacturers and power suppliers in planning sales programs for 1957, and for agricultural and educational agencies in planning farm power use programs.

Relighting trend increases

In line with the national trend toward relighting, more than half of the recent lighting installations in the Dallas area have been classified "lighting modernization."

By John B. Deck, Jr., Lighting Specialist, Texas Power & Light Co., Dallas, Texas.

This bank lobby installation employs a vinyl-plastic ceiling over the customer area with rows of slimline lamps on 3-foot centers, mounted two feet above the plastic. Recessed fluorescent louvered units light the tellers area, with a 150w R-40 downlight over each deal plate.

Parabolic aluminum troffers with cross baffles are a popular form of office lighting. Spacing of the 2-lamp units is six feet. In offices, the use of low-brightness fluorescent fixtures is increasing along with higher-than-minimum illumination levels.

◆ Out of 1,000 commercial lighting installations made in the Dallas service area during the first half of the year, it is interesting to note that 55 per cent of these projects were classified "lighting modernization" and only 45 per cent were in the "new construction" category.

This is a strong indication of the increasing importance of the relighting market to the electrical industry.

Our own promotional efforts, carried out by 30 lighting salesmen in the field, have been directed primarily toward relighting existing establishments. These men assist electrical contractors in planning modernization jobs and in selling owners on the benefits of relighting.

Very good cooperation is being shown by the lighting distributors in furnishing sales help and sample equipment for trial installations.

Lower ceiling trend

In store modernization we see a trend toward the lowering of old ceilings to around 9 feet, with increased use of built-in fixtures. The "outstanding" 50 foot-candle installations of a few years ago are being surpassed by those of 80 to 100 foot-candles.

Perimeter lighting is gaining ac-

ceptance in merchandising areas to give a more spacious atmosphere.

One of the best sales tools our commercial lighting representatives have used is a fluorescent lamp color demonstrator. By showing merchants how the appearance of their merchandise is improved with the Deluxe lamps, our salesmen create interest in lighting and gain the customer's confidence.

In a typical store relighting installation, the illumination was increased from 15 to 80 foot-candles with louvered slimline fixtures. A mixture of Daylight and Standard Cool White lamps was replaced by Deluxe-type, and 200 watt PAR-46 incandescent units provide accent.

School lighting

For several years we have carried on a program of promoting Certified Lighting for school classrooms. Schoolroom installations are "certified" when they meet the ASA - IES standards for illumination, painting, and control of daylight glare. In 5½ years, 3,000 remodeled classrooms have been certified.

Indirect incandescent is still the most popular type of fixture being used by schools, although fluorescent equipment is gaining in use each year.

In offices, the use of low-brightness fluorescent fixtures is increasing along with higher-than-minimum illumination levels. Parabolic aluminum troffers with cross baffles are also popular.

Luminous and louvered ceilings are finding more applications in the institutional field as well as in offices and stores. Most installations cover a portion of the ceiling area, rather than all of it, to prevent a monotonous effect.

A bank lobby installation employs a vinyl-plastic ceiling over the customer area with rows of slimline lamps on 3 foot centers, mounted 2 feet above the plastic. Recessed fluorescent louvered units light the tellers area, with a 150 watt R-40 downlight over each deal plate.

A year ago, industrial plants with fluorescent upward - component fixtures were a rarity. We now have about a dozen such installations completed with others underway. These installations are in the 40 to 60 foot-candle range.

These "Before and After" photographs show a relighting installation where the illumination was increased from 15 to 80 foot-candles with louvered slimline fixtures and lowered ceiling. A mixture of Daylight and Standard Cool White lamps was replaced by Deluxe-type, and 200-watt PAR-46 incandescent units provide accent lighting.

Other factory areas are being lighted with mercury-vapor lamps, some of the color-improved type. Most of these use the 400-watt lamp.

Promotion program

Last fall a Home Lighting Department was organized to promote wider acceptance of modern lighting in the residential field. Work was begun in two areas: educating consumers to demand better lighting, and encouraging builders to play up lighting as a sales feature of their new homes. In nearly every town we serve, lighting programs were presented to ladies clubs and school groups and a great amount of interest was created.

Model homes in several towns have featured valance and cornice lighting, under cabinet lighting, soffit lighting, and use of larger-sized glassware in conventional fixtures.

During the summer, garden lighting installations went into key areas and future activity in yard and garden lighting appears to be very promising.

Simplifying the product line

Product simplification and standardization has always been considered a worthy industrial objective, but user simplification may sometimes be achieved through a product design that actually results in a somewhat more complicated manufacturing process.

By R. C. Graves, Vice-President Sales, Federal Pacific Electric Co., Newark, N. J.

◆ TO MANY OF US the subject of product simplification must bear a great resemblance to peace. Everybody is for peace, yet we still have wars. So everybody is for product simplification, yet we still have a good many Rube Goldberg devices. As a matter of record, to speak of product simplification seems to be the direct antithesis of what we are observing today.

Let's cite the automotive industry as a prime example. Remember the Model A? There was a simple product, designed for assembly line production, in about as simple a form as you could get. In terms of product simplification, it should be the model for the automobile of today.

But the automobile industry isn't alone. Look at the "simple" toaster. Years ago, if a piece of toast was desired for breakfast the lady of the house simply put a piece of bread in the oven until it browned. But not today! Now madam housekeeper has a multitude of brands to choose from. And most of these brands are designed to accept one, two or three slices of bread, they're thermostated for color control, adapted for muffins, designed to keep toast warm indefinitely.

Needless to say, you can see the same trend in almost all products. Just look in any shop window and you must be convinced. From accordions to zippers, the trend seems to be away from simplification to "complification." But . . . it ain't necessarily so!

To get the full impact of simplification we've got to look in depth. We must examine first of all the meaning of product simplification.

This article is adapted from a talk presented before the Industrial Conference Board in New York City.

Now I submit that simplification does not mean eliminating a feature here or there. It does not mean doing away with a given number of nuts and bolts. It does not mean making one item do the work of several—remember the unsuccessful combination dish and clothes washer?

True simplification is to the manufacturer a reflection. It is a reflection of *user* simplification and *user* gratification. And this applies equally to consumer products and industrial products.

Yes, the word just coined is "complification," by which we mean the addition of product features, complicating the manufacturing process, but simplifying the product from the *user's* point of view. Complification is not the antithesis of simplification—it is just another form of the same thing. At Federal Pacific, we've parlayed the right combination of product line simplification plus user simplification into a major new business. And this new business is not only for us but for the entire industry.

Circuit breaker example

Six years ago we introduced a new product line. This was the Stab-lok circuit breaker and its associated steel enclosures for household service entrance applications. In the old fuse box, many hundred variations were required to meet all requirements, and perhaps 200 of these were moving actively enough to be classed "standard." The Stab-lok system reduced the number of enclosures to 37, plus 18 common stab-in breakers. Thus 55 catalog numbers now meet requirements formerly calling for hundreds of different items.

And who benefited? Federal Pacific, obviously, since we now concentrate on mass production of a few devices rather than job-lot assembly of many. Our electrical distributors, too, by maintaining a closer inventory of fewer items and still meeting most demands. And the end *user* in our field, the electrical contractor, benefits perhaps most of all, for now he can secure the device he wants at any time, install it when he is ready, make changes at the last minute to suit the houseowner, and do all of this with a minimum cash outlay. The homeowner benefits too, because he receives safe, convenient circuit protection. Even our competitors, in the long run, have benefited through the introduction of an entirely new business.

New simplification example

Right now we're introducing another in the long series of attempts at product simplification . . . the StABreaker line of panelboards and individually enclosed industrial air circuit breakers.

Panelboard and distribution switchboards used widely by commercial and industrial installations have marketing problems all their own. Because of rigid specification requirements, this product had been handled on a custom basis by hundreds of small manufacturers. Like our major competitors, we competed in the conventional manner, utilizing five regional panelboard shops spotted across the country. These islands of local service presented a challenge. Rather than expand indefinitely the number of captive plants—with the capital requirements involved—Federal Pacific went to work to attempt panelboard standardization, whereby an assortment of standard components could be readily assembled.

Now we have taken the big plunge. We have attempted to achieve the ultimate in panelboard product simplification aimed at *user* gratification in this field. Here are the major considerations in product simplification which underlie the story:

Design simplification. Rather than design entirely a new, unfamiliar, and untested product, we made relatively simple modifications of the existing product.

Manufacturing simplification.

Because these were modifications of a standard product, manufacturing changeover is simple.

Distribution simplification. The new product line is marketed through our existing distribution channels. No pyramiding of sales force, dealers, or distributors.

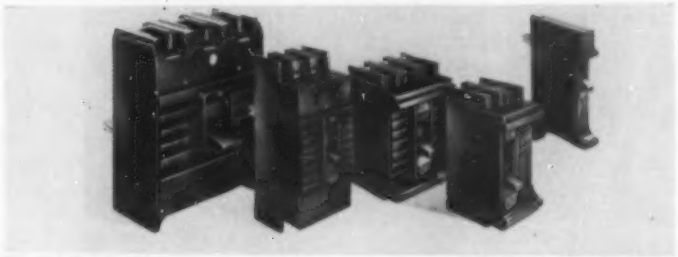
Merchandising simplification. We have prepared the industry for this announcement through repeated "teaser" ads in national trade magazines. Now we will offer it nationally through a basically simple medium. One man knows the story best, and he will tell it in dozens of locations nationally every day for several weeks. How? By simplifying his story and putting him into a "movie" which can be used whenever and wherever needed.

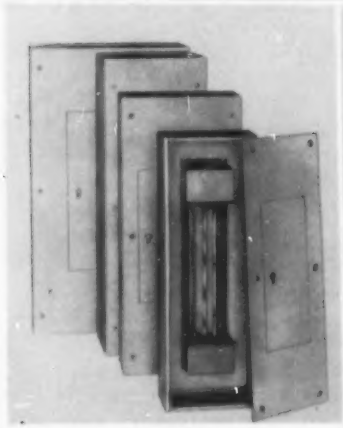
The moral is obvious! When you decide that "product simplification" is the solution to your manufacturing, marketing, or profitability problems, look first at the user's side of the coin. If you please him, you stand to gain enormously.

This is an example of product line simplification. We have gratified a user requirement, simplified his requirements by developing what is on the surface an infinitely more complicated product.

This then, is the trend. Industry will continue to adapt its products to the requirements of the users; industry will continue to adapt its thinking away from the old dictum of "me first" to the infinitely more ethical, practical and profitable consideration of "that which is of the greatest good for the greatest number of people."

Standardized circuit breaker units and enclosures simplify distribution panelboard installations





A COMPLETELY new concept of panelboard design for industrial and commercial electrical distribution has been announced by Federal Pacific Electric Co., according to C. A. Schmidt, product sales manager.

"The new concept," Mr. Schmidt reported, "has been made possible by the advanced development of compact modular design molded case circuit breakers and standardized metal clad panelboard enclosures for power distribution busses rated up to 600 amperes.

"With the new molded case breakers and enclosures, available nationally through electrical distributors, electrical contractors can quickly and efficiently assemble modern distribution panels on the job. Flexibility of design eliminates need for custom-built panelboards that often incurs needless loss of time, material, money and convenience as far as the contractor is concerned."

At top: The complete line of Type AB StABreakers, ranging from the 11/16" single-pole type E to the 225-ampere three-pole type J.

Lower left: Four different panel assemblies with single and double bussing accommodate E, F and J frame StABreakers with main capacities up to 600 amperes. Branch circuits required determine the panel assembly needed.

Lower right: Installation of StABreakers is a simple plug-in operation. They are supplied in all standard ampere ratings up to 225 amperes, 600 volts.

Distribution called key to business profit boost

ONE WAY of helping business overcome a declining profit picture was outlined recently by Arthur W. Hooper, Executive Director of the National Association of Electrical Distributors.

In an address before the annual convention of the American Society of Association Executives, Mr. Hooper discussed what associations can do to assist their members in helping them to develop a sound approach to this pressing problem.

The importance of showing both manufacturers and customers why it is vital to them that their wholesaler be financially healthy—to protect their own investment as well as the wholesalers—was stressed by the NAED executive.

Better distribution in all fields, and not just in the electrical wholesaling industry, depends on attaining certain objectives. Mr. Hooper said, that in his opinion, the key to the solution to the wholesale distributor's problem lay in the awakening of the national economy as to the place and value of the wholesale distributor.

One of the measurements of the American public's standard of living was the ability to provide what the people demanded and at the place and time that they wanted it, and at the lowest cost. Investment in expansion of production facilities has been made possible because production has been profitable. The investment was good because more goods can now be produced for more people at less cost.

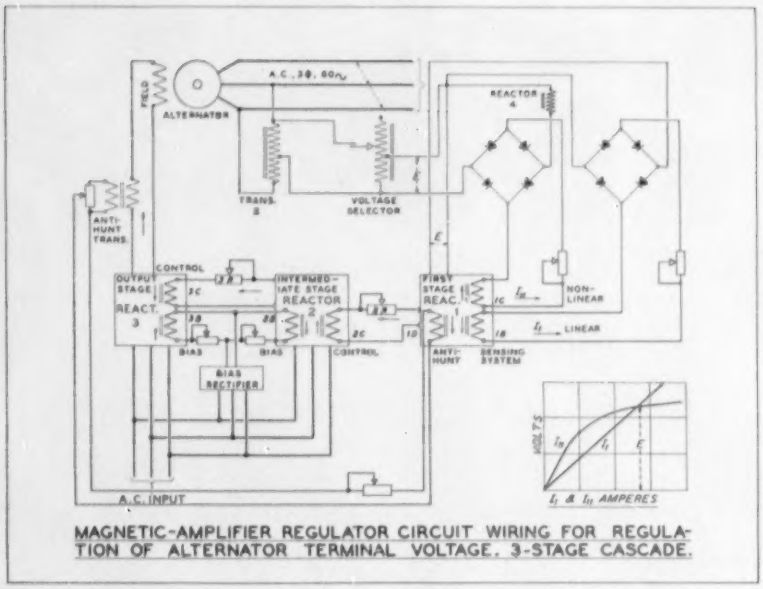
"The one stumbling block," Mr.

(Continued on page 133)

Maintenance engineers' notebook

Maintaining static-magnetic regulators

Because static-magnetic regulators have few moving parts, they may not always receive the maintenance consideration they deserve. Their maintenance requirements are summarized in this article.



MAGNETIC-AMPLIFIER REGULATOR CIRCUIT WIRING FOR REGULATION OF ALTERNATOR TERMINAL VOLTAGE, 3-STAGE CASCADE.

Regulators utilizing magnetic amplifiers are finding application on a variety of industrial electrical equipment. Shown here is circuit for voltage regulation on a-c generators. Wide use of such equipment is being made in speed control for industrial machines.

◆ IN THE REALM of regulating and control equipment, the static magnetic amplifier is a relative newcomer. They first became generally available for common regulating applications about ten years ago, and their use has steadily increased so that the device is rapidly gaining an important position in the industrial field. In many cases they have already replaced well established electro-mechanical and static electronic types of regulators and controls. Consequently, it is probable that it will soon be necessary for electrical maintenance personnel to be as familiar with static magnetic amplifiers as they now are with the conventional and more familiar devices which they now service.

Currently, the most important use for this new type of regulator is in the control of the terminal voltage of alternating current generators. See schematic diagram for a typical control scheme. Magnetic amplifiers have been applied to generators of all sizes up to some of the largest built. They are also used to regulate the terminal voltage of synchronous condensers, inverters, and frequency changers.

In their capacity as voltage regulators, they have been installed in power plants operated by public utilities, manufacturing plants, railroads, and ships, railway passenger cars, and even institutions. At present they are appearing as regulators for induction-heating generators and portable engine-driven machines. Static magnetic regulators (amplifiers) are widely employed to regulate the load of large turbine-driven a-c generators, the power factor of synchronous motors, the speed of direct-current motors, and the current delivered by d-c generators.

The name: static magnetic, accurately describes the unusual design features of this device. The term static is derived from the fact that all the regulator components are stationary; the term "magnetic" is used to indicate that performance of the regulator is largely based upon the characteristics of the magnetic circuits.

Static magnetic regulators consist of transformers, reactors, resistors, capacitors, and dry metallic rectifiers, which are interconnected in electrical circuits to provide a regulating function. A typical voltage regulator is illustrated in the accompanying diagram.

Statomag-regs are frequently associated with amplidynes, which are a special type of direct-current generator having unusually high amplification ratios and rapid speeds of response. They are also used with or may include amplistats, or magnetic amplifiers, and it is expected that this association will become increasingly significant in the future.

Because of the absence of mov-

ing parts and the use of components which are simple, rugged and long-lived, statomag-regs are extremely reliable, and require only a minimum of maintenance. As a result, they are frequently neglected by maintenance personnel who are obliged to inspect them occasionally to make an adjustment here and there. Such neglect can result in failure of the regulator with possible damage to the controlled or master equipment with which it is associated. Therefore, even though their maintenance may consist of little more than brief and infrequent inspections, statomag-regs should be included in the regular maintenance schedules if they are to give long and trouble-free operation.

Normal maintenance

Normal maintenance of static magnetic regulators consists essentially of visual inspections. These may be made at regular intervals and in no case should a period exceeding six months be allowed to elapse between inspections. At each inspection, it should be ascertained that all wiring connections are tight; that the amplifier components are not overheating as evidenced by abnormally high surface temperatures, discoloration or damage to insulation; that grounds are not present in the circuiting except where normally designed, and that the unit is entirely clean and free from all evidence of moisture. Where the regulator is subject to vibration, the security of anchoring bolts and screws should be checked.

If the condition of the regulator is not satisfactory in these respects it should be removed from service before corrective action is taken by the maintenance personnel. All components in an unsatisfactory condition and apt to become unreliable should be replaced. Dirty regulators should be carefully cleaned with carbon tetrachloride fluid. Dry compressed air at reduced pressure is recommended for general dusting. Grounds must be located and eliminated.

If evidence of moisture is present, as indicated by rust on ferrous parts, water, condensation, etc., immediate steps must be taken to correct this condition. In cases where condensation of moisture within the regulator is apparent, it may be necessary to improve ventilation or to move the unit and locate it where less moisture is present.

Statomag-regs are usually equipped with rheostats or variable transformers for adjustment purposes. The sliding contacts of these devices must be inspected to make certain that they are in good condition, that oxides are not present on the contact surfaces, causing high contact resistance and subsequent heating.

Where necessary, contact surfaces may be cleaned with carbontet and crocus cloth. Contact brushes may be reseated, if required, with crocus cloth; all residue resulting from the reseating operation must be carefully removed. Lubrication of the shafts and bearings of rheostats and tapped transformers is not generally required and should be attempted only where specifically recommended by the manufacturer.

Electrolytic capacitors are frequently used in stabilizing and filtering circuits of statomag-regs. They will age even though the unit is not in service, and since they are subject to failure after several years of life, it is recommended that they be replaced every two to four years. Such arbitrary replacement is, however, seldom mandatory, since serious capacitor aging will usually produce unsatisfactory regulator performance, thereby automatically indicating when replacement is necessary.

It may be stated here that in-asmuch as these filtering and stabilizing capacitors are invariably connected across the output of the rectifier circuits, a short-circuited capacitor can severely damage the rectification bloc. Adequate fusing to unit capacity is therefore imperative.

In cases where reliability is of the utmost importance, a spare unit may be provided for replacement purposes in the event of failure of normal "line" equipment. Wherever possible, spare regulators should be energized and "loaded" in order to keep them in good condition and to determine that they are prepared for immediate service in the event of an emergency. They should be used for several hours at least once a year, and more frequently if they are stored in a damp location or humid climate.

Care should be exercised when regulators including selenium rectifier stacks are energized after an unusually long period of inactivity, since operation may be erratic for several minutes until heating engenders normal performance.

In order to obtain optimum performance of a regulator, and to protect against the possibility of damage to the unit from external causes, it is important that equipment associated with the regulator be properly maintained. Related equipment may include motors, generators, transformers, exciters and prime mover speed governors.

Rotating machine field and armature circuits to which the regulator is connected must be kept free of grounds. Exciter commutators, alternator collector rings, and their associated brush rigging must be electrically and mechanically maintained to insure that the regulator will have proper control of machine circuits and activity. System voltages and a-c frequencies should be measured to determine that they fall within the limits for which the regulator was designed.

Causes of failure

Failure in service of statomag-regs may result from two principle causes. These are failure through aging of component parts—especially of the capacitors and rheostats—and failure because of abnormal operating conditions. Regulator failures resulting from aging of components should be infrequent, consequently when repeated failures occur, amplifier operating conditions should be carefully investigated to determine if they are causing the difficulty.

When a damaged regulator has been removed from service, it is usually quite difficult to determine by visual inspection the true cause of the failure. This is particularly difficult since the failure of one component, through aging or abnormal operating conditions will frequently result in the failure of other components, making it almost impossible accurately to ascertain just which part failed first.

Failures of transformers and reactors as a result of aging is usually due to deterioration of winding insulation because of excessive temperatures. Under normal circumstances, failures due to this cause should not be experienced until the regulator has provided many years of satisfactory service. Aging of metallic rectifiers may also cause failure resulting from a gradual breakdown of the barrier layer between the plates or disks. Again, however, this kind of fail-

(Continued on page 133)

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

CABLE NON-METALLIC SHEATHED
FARM BUILDINGS OR GARAGES

NO. COND'S SIZE	HOURS PER C	LABOR COST PER FT. INSTALLED AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2/14	3.2	.04	.048	.056	.064	.072	.08	.088	.096	.104	.112	.12
3/14	3.4	.043	.051	.06	.068	.077	.085	.094	.102	.111	.119	.128
4/14	3.6	.045	.054	.063	.072	.081	.09	.099	.108	.117	.126	.135
2/12	3.4	.043	.051	.06	.068	.077	.085	.094	.102	.111	.119	.128
3/12	3.7	.046	.056	.065	.074	.083	.093	.102	.111	.12	.13	.139
4/12	4.0	.05	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15
2/10	3.8	.048	.057	.067	.076	.086	.095	.105	.114	.124	.133	.143
3/10	4.0	.05	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15
4/10	4.3	.054	.065	.075	.086	.097	.108	.118	.129	.14	.151	.161
2/8	4.0	.05	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15
3/8	4.3	.054	.065	.075	.086	.097	.108	.118	.129	.14	.151	.161
2/6	4.3	.054	.065	.075	.086	.097	.108	.118	.129	.14	.151	.161
3/6	4.6	.058	.069	.081	.092	.104	.115	.127	.138	.15	.161	.173
2/4	5.0	.063	.075	.088	.10	.113	.125	.138	.15	.165	.175	.188
3/4	5.4	.068	.081	.095	.108	.122	.135	.149	.162	.176	.189	.203

E-101-B

LABOR: Includes preparation, drilling, cutting, strapping and connecting to boxes. (no taps or excavating.)

11-56

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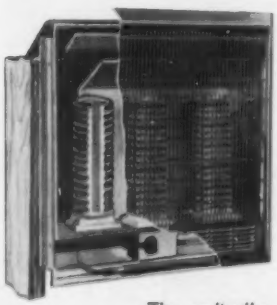

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CABLE NON-METALLIC SHEATHED
MEN (WOOD) OFFICE BLDGS.

NO. CONDR'S SIZE	HOURS PER C	LABOR COST PER FT. INSTALLED AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2/14	4.9	.061	.074	.086	.098	.11	.123	.135	.147	.159	.172	.184
3/14	5.1	.064	.077	.089	.102	.115	.128	.14	.153	.166	.179	.191
4/14	5.5	.069	.083	.096	.11	.124	.138	.151	.165	.179	.193	.206
2/12	5.1	.064	.077	.089	.102	.115	.128	.14	.153	.166	.179	.191
3/12	5.5	.066	.08	.093	.106	.119	.133	.146	.159	.172	.186	.199
4/12	5.9	.074	.089	.103	.118	.133	.148	.162	.177	.192	.207	.221
2/10	5.5	.066	.08	.093	.106	.119	.133	.146	.159	.172	.186	.199
3/10	5.9	.074	.089	.103	.118	.133	.148	.162	.177	.192	.207	.221
4/10	6.1	.076	.092	.107	.122	.137	.153	.168	.183	.198	.214	.229
2/8	5.9	.074	.089	.103	.118	.133	.148	.162	.177	.192	.207	.221
3/8	6.1	.076	.092	.107	.122	.137	.153	.168	.183	.198	.214	.229
2/6	6.1	.076	.092	.107	.122	.137	.153	.168	.186	.198	.214	.229
3/6	6.9	.086	.104	.121	.138	.155	.173	.19	.207	.224	.242	.259
2/4	7.2	.09	.108	.126	.144	.162	.18	.198	.216	.234	.252	.27
3/4	7.8	.098	.117	.137	.156	.176	.195	.215	.234	.254	.273	.293

E-101-B

LABOR: Includes preparation, drilling, cutting, strapping and connecting to boxes. (No taps or excavacating.)

11-56

Electrical Estimating—III

UNDERGROUND CABLE (NON-METALIC)
OPEN TRENCH WORK — ONE CONDUCTOR

CABLE SIZE	HOURS "M"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
12	2.3	.0029	.0035	.004	.0046	.0052	.0058	.0063	.0069	.0075	.0081	.0086
10	3.6	.0045	.0054	.0063	.0072	.0081	.009	.0099	.011	.012	.013	.014
8	4.2	.005	.006	.007	.008	.01	.011	.012	.013	.014	.015	.016
6	5.9	.007	.009	.01	.012	.013	.015	.016	.018	.019	.02	.021
4	7.2	.009	.011	.013	.014	.016	.018	.02	.022	.023	.025	.027
2	10.4	.013	.016	.018	.021	.023	.026	.029	.031	.034	.036	.039
1	11.3	.014	.017	.02	.023	.025	.028	.031	.034	.037	.04	.042
1/0	13.2	.017	.02	.023	.026	.03	.033	.036	.04	.043	.046	.05
2/0	15.0	.019	.023	.026	.03	.034	.038	.041	.045	.049	.053	.056
3/0	17.0	.021	.026	.03	.034	.038	.043	.047	.051	.055	.06	.064
4/0	19.8	.025	.03	.035	.04	.045	.05	.054	.059	.064	.069	.074
		TWO CONDUCTOR										
12	2.9	.0036	.0044	.0051	.0058	.0065	.0073	.008	.0087	.0094	.01	.011
10	4.5	.006	.007	.008	.009	.01	.011	.012	.014	.015	.016	.017
8	5.4	.0068	.008	.095	.011	.012	.014	.015	.016	.018	.019	.02
6	7.6	.01	.011	.013	.015	.017	.019	.021	.023	.025	.027	.029
4	9.7	.012	.015	.017	.019	.022	.024	.027	.029	.032	.034	.037
2	13.8	.017	.021	.024	.028	.031	.035	.038	.041	.045	.048	.052
1	15.4	.019	.023	.027	.031	.035	.039	.042	.046	.05	.054	.058
1/0	18.0	.023	.027	.032	.036	.041	.045	.05	.054	.059	.063	.068
2/0	20.7	.026	.031	.036	.041	.047	.052	.057	.062	.067	.072	.078
3/0	23.3	.029	.035	.041	.047	.052	.058	.064	.07	.076	.082	.087
4/0	27.6	.035	.041	.048	.055	.062	.069	.076	.083	.09	.097	.104

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LABOR: INCLUDES; SETTING UP REELS, LAYING CABLE, AND CONNECTING AT ENDS.

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Electrical Estimating—III

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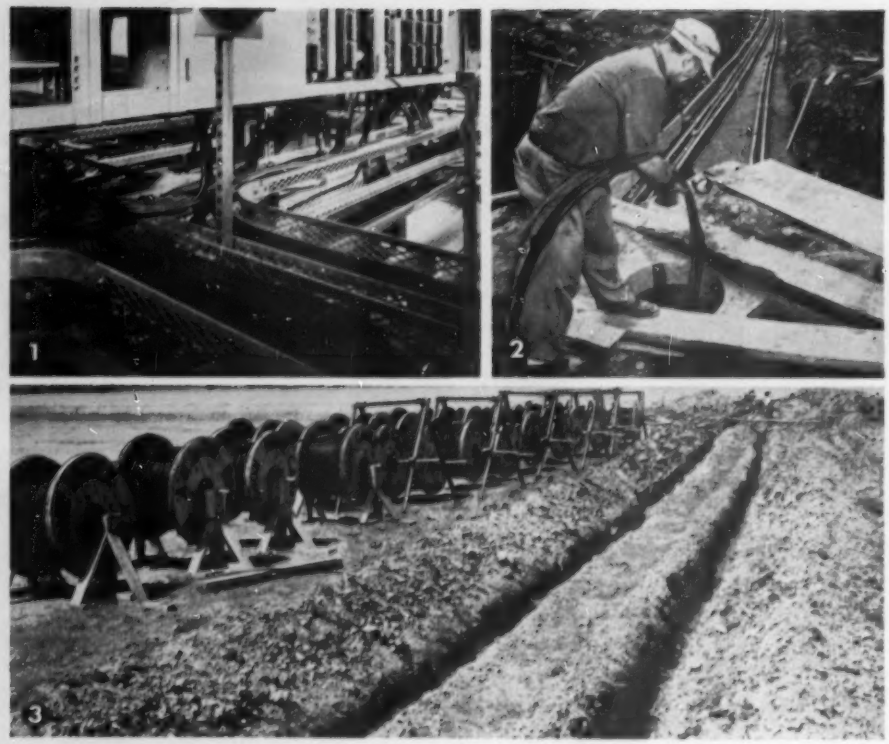

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When you install RoMarine-Ro-Prene cable instead of a cable with metallic covering, you can save money three ways:

- Lower original purchase or replacement cost
- Easier termination and splicing
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Extremely versatile and tough, RoMarine-RoPrene cable can be buried directly in earth, installed in ducts or conduits, or hung overhead on poles. No longer must you stock three different kinds of 600-volt cable. And easier termination and splicing will provide further economies—every 30-minute saving is worth more than $2.00 to you!

Long Service Life Also Assured

Besides economy, you get real dependability from this versatile and rugged Rome cable. The tough Neoprene jacket assures an exceptionally long service life. It's light in weight; it's virtually immune to the effects of electrolysis, corrosion, and temperature extremes; and it's highly resistant to oils, acids, alkalies, moisture, abrasion, flame and weather.

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CORPORATION

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by Arthur L. H. Street

Compensation awarded for accident injury

◆ A JOURNEYMAN electrician injured in the course of his work may be entitled to an award on the basis of permanent partial disability on proof that his earning *capacity* has been lessened, although his *earnings* may not yet have lessened. The Texas Court of Civil Appeals, San Antonio, so decided in the case of Texas Employers' Insurance Assn. v. Taylor, 276 S. W. 2d 901.

Taylor, employed by an electric company, was run over by a truck. Five weeks later he returned to limited work, supervising jobs. He received wages at least equal to what he had received before the accident.

The employer's liability insurer challenged Taylor's right to a compensation award because his *earnings* had not diminished. The court overruled that contention, on the ground that the evidence showed that his earning *capacity* had lessened, due to permanent injury, consisting of broken clavicle and ribs, and nerve injury to his left elbow. Considering specially the nature of work that an injured electrician can do, the court said:

Taylor's "statement as to his injury and ensuing disability was that he was unable to perform hard physical labor that required lifting or bending. There was testimony of two basic classifications of workmen in the electrical trade, namely, journeymen and apprentices. The work they were called upon to do generally called for manual labor. A journeyman might be placed in charge of a job or a portion thereof as a working foreman, in which position he was expected to work with tools. He might also be designated as a supervisor, in which position he was not expected to perform manual labor. When no position as supervisor is open, the electrician reverts to the position of journeyman or working foreman, if he wishes to keep working.

"The evidence supports the theory that by reason of his injuries," Taylor "was disabled or greatly handicapped in performing the duties of a journeyman electrician or working foreman. He apparently is not physically disqualified from performing supervisory work, as is demonstrated by his employment record since his injury. This does not mean, however, that he has suffered no diminution of earning capacity. Although one may be able to serve in a supervisory capacity at a higher rate of pay, a showing that such positions are not always available nor as common as jobs requiring journeymen and working foremen, will support a finding of partial incapacity."

When the contractor buys supplies

IF A CONTRACTOR buys supplies for special use on a particular job and intends to make the purchase on the credit of the owner for whom the contract is to be performed, he ought to see to it that the supplies are so charged on the seller's books.

That is the valuable legal tip to be found in a recent decision handed down by the Louisiana Court of Appeal in New Orleans in the case of Nulite, Inc., v. Mariano, 86 So. 2d 548.

A contract to wire a building called for installation of a large attic fan, but the evidence in this case did not show who, as between the electrical contractor and the owner, was to provide the fan.

The contractor had a credit account with plaintiff, an electrical supply dealer, and bought a fan which was charged to his running account. He ordered it to be delivered at the building. It was charged at the wholesale price available to contractors but not to building owners.

The contractor was billed several times and once promised to pay the account in installments, but failed to do so. When sued on the account, he unsuccessfully defended on the ground that he bought the fan *as the owner's agent*. The Court of Appeals thought that the above stated corroborated the electrical supply dealer's testimony that the contractor did not at the time claim to act as the owner's agent in making the purchase, and that at the time he did not make any statement indicating that he was not buying the fan on his own account to fulfill his contract to wire the building.

Right to maintain neon advertising

TITLE TO a vacant lot in a Tennessee city was held subject to a condition in deeds that the lot be used only for residential purposes. Adjacent lots were subject to the same condition.

A 12- by 18-foot neon sign directing traffic to a nearby drive-in theatre was erected on the lot.

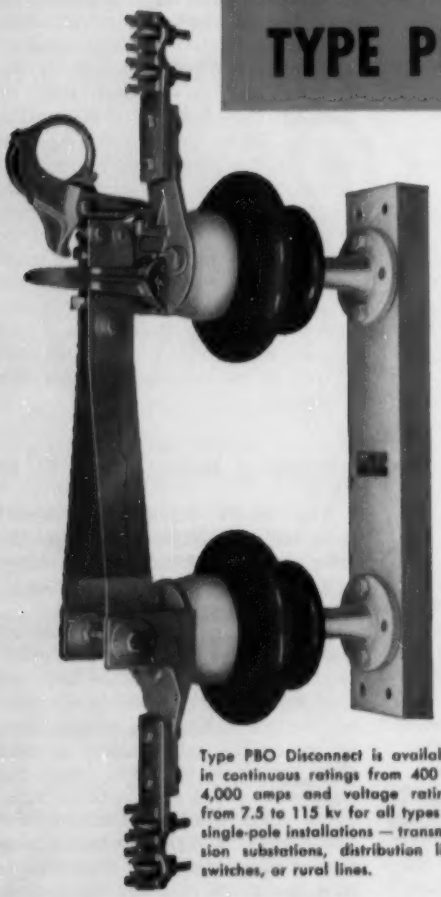
On complaint of owners of nearby homes, the Tennessee Court of Appeals, Eastern Section (Knoxville) decided that such use of the lot violated the title restriction. (Owenby v. Boring, 276 S. W. 2d 757.)

The court rejected argument that the restrictive clause in the title applied only to the character of buildings that might be erected, and not to use as vacant land.

Because an injunction against the use made violated the building restriction, the court did not find it necessary to decide whether or not an injunction might have issued on the independent ground that the glare of light from the sign constituted an abatable nuisance. This was so because the owners of the sign had taken particular pains to reduce, if not eliminate the glare into nearby homes.

PINE BLUFF, ARK.—Typical of numerous installations of the Type PBO is this one on the Pine Bluff Division, Arkansas Power & Light Co.

MORE UTILITIES THAN EVER BEFORE ARE CHOOSING SOUTHERN STATES' TYPE PBO DISCONNECT SWITCHES



Type PBO Disconnect is available in continuous ratings from 400 to 4,000 amps and voltage ratings from 7.5 to 115 kv for all types of single-pole installations — transmission substations, distribution line switches, or rural lines.

The growing popularity of the Type PBO Disconnect, for substation and distribution line switching, can be attributed to the preference of utility engineers for these outstanding features:

HIGH PRESSURE double-line contacts. Positive contact assured by wiping action of accurately machined surfaces. Hard drawn copper bus bar blades; double blade construction. 90° open blade stop unless otherwise specified.

EXTRA LARGE OPERATING RING of heavy duty construction.

POSITIVE LATCHING of blade in the closed position prevents opening under fault currents or from vibration.

BLADE PRY-OUT applies a powerful mechanical force to open the blade even under heavy coatings of ice.

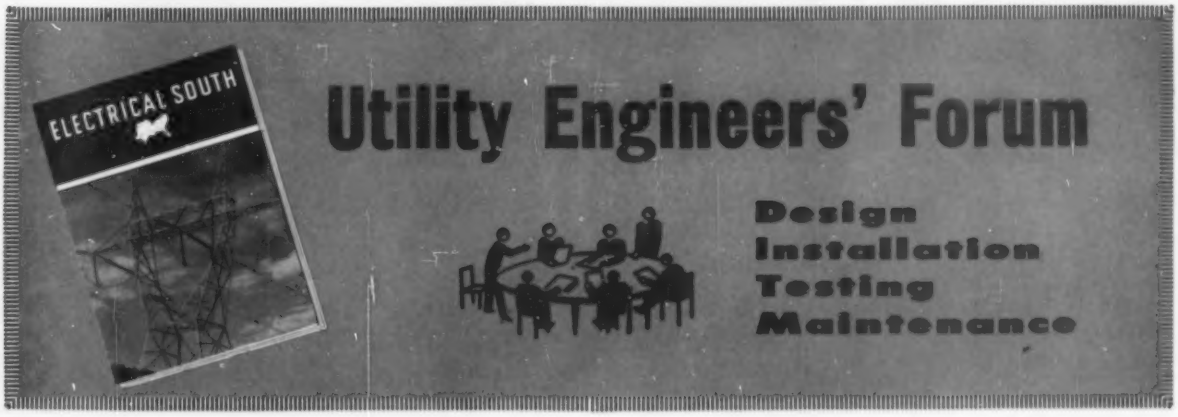
CAST BLADE GUIDES are rigid and wide-flaring to position the contacts properly on each closing operation.

STEEL BASES, hot-dipped galvanized after fabrication, are available to specification.

Full details are contained in our Bulletin 55 PBO, a copy of which will be mailed gladly upon request.

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto



Growing loads demand new techniques

By G. W. Bean, Chief Engineer, and B. M. Gallaher, Texas Electric Service Co., Fort Worth, Texas

◆ THE CONTINUED acceptance and need for air-conditioning has again raised the distribution loads in this area. The peak loads served by this system during 1956 were approximately 18 per cent higher than the peak of 1955. Although these loads were somewhat higher than predicted, due chiefly to a hotter than normal summer, the distribution successfully served all areas with a minimum of trouble. It is believed that this is due, in general, to techniques and practices being used for several years, including:

1. An annual calculation of voltage spreads on each feeder, thereby determining the weak spots and the remedial measures required to correct the feeder for the following year's anticipated load.

2. Capacitors, both switched and fixed banks, are added as required by conditions indicated for each feeder.

3. Continued use of machine billing methods (IBM cards) for calculation of transformer loading, thereby permitting transformer changeouts during the winter months.

4. The use of 7200-volt transformers without taps has found acceptance by the operating personnel and commercial men from several standpoints:

a. Voltage on the primary is normally bus-regulated and is kept within prescribed limits based upon calculations of voltage spreads.

b. Voltage at the substation bus is boosted approximately 4 per cent during peak load periods over minimum load periods and supplementary correction is obtained by switched capacitor banks.

c. Where a voltage complaint does arise due to a customer's ad-

(Continued on page 130)

TESCO engineer examines the printed IBM report of distribution transformer loads which occurred during the past summer.

Developing distribution construction standards

The development of distribution construction standards has resulted in substantial dollar savings for this southwestern electric utility company. This article explains how the company's standards committee functions and what has been accomplished in a short period.

By Robert F. McClure, Chief Distribution Design Engineer, Southwestern Public Service Co., Amarillo, Texas.

◆ THE DEVELOPMENT of distribution construction standards and standard material catalogs has been very successful from a financial point of view for this company.

After several years of experience with such standards, we have found that our total stores inventory has, as of May, 1956, decreased $530,146.00 from the corresponding figure of January, 1953, the date on which The Standards Committee first became operative. This decrease in Stores Inventory occurred while the system grew from approximately 450,000 kilowatts to approximately a 750,000 kilowatt system, which growth necessitated an increase in standby fuel oil stocks and generating station repair part stock of $106,000 in the period January, 1953 to May, 1956.

This decrease in stores inventory is due to (1) the number of items carried in stores has been reduced, for example, the electric distribution group eliminated 960 items, and (2) the months required for turnover of stock has been reduced from 5.9 to 2.60, based on 12 months to date May, 1956 figures.

Other savings realized

The adoption of distribution construction standards has also resulted in decreased cost of many distribution materials. For example, one-wire secondary racks which were purchased before the Standards Committee was organized cost from $0.41 to $1.14 and the average was $1.00 each. The selected standard rack cost $0.41. Since we purchase an average of 20,550 in twelve months, this change saves approximately $12,100 per year.

Another cost reduction came about through the adoption of ACSR for urban conductors. With respect to just two sizes of wire, #6 and #4 copper, the change to ACSR saves us approximately $35,080 based on our annual usage. The above items alone amount to approximately $47,180 annual savings.

There is evidence that unit labor costs are also reduced by the use of distribution construction standards. For example, the per cent ratio of payroll to material for closed distribution line orders was reduced from 45.2 (on August 31, 1952) to 38.8 (on August 31, 1955), a decrease of 6.4%. Applied to a typical year's distribution line orders, that reduction in payroll in its relation to materials amounts to approximately $66,000.

The Standards program has been responsible for many other construction cost savings, but it is obvious that any one of the above mentioned savings is far more than the annual cost of the standards program.

Plan improves morale

In addition to the actual savings, there were a number of intangible benefits resulting from the standards program. One of these is improved working relationship between each of the several divisions because of common understanding of problems. Another is improved morale of construction and engineering employees because all are using the same plan, derived from the best ideas of many members of this company, a plan in which they participated.

For those considering the adoption of such a program, we offer three points as being particularly important. Standard construction drawings and standard material catalogs should be developed in conjunction with a store's inventory control program. A committee is required to do the best possible job and then to sell it. Management's enthusiastic, outspoken and maintained support of the program will insure its success

The Standards Committee of this company included one representative from each of the 5 divisions of the company. The manager of each division participated in the selection of an engineer who was working in a supervisory capacity or a distribution design capacity in his division.

In general, the representative's qualification requirements were that he have a good knowledge of the work and people of the various departments and their divisions; that he be enthusiastic about the standards program, and able to sell the standards program to division personnel; and that he be open minded and inquisitive about the merits of each line design and each item of material and equipment, and a hard worker.

Committee's personnel

In addition to these 5 representatives, the committee includes the chief distribution design engineer of the system engineering office, who serves as chairman of the committee; the vice-president of engineering is represented by an administrative assistant, who is active in the inventory control program. The system purchasing agent and the system store-keeper are invited to the meetings as consultants.

One senior engineer from the system distribution engineering department attends each meeting to learn what new drawings are required. Both he and a design draftsman work full time on Standards Committee projects. Occasionally another senior engineer from system engineering department will present a technical data

drawing to the committee.

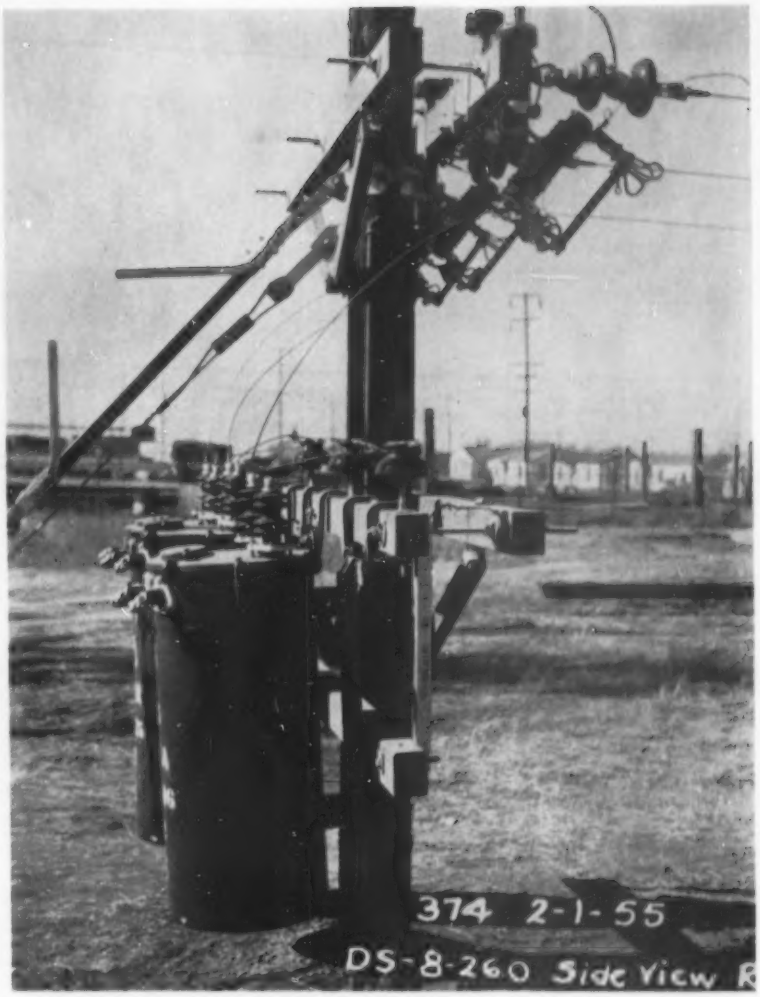
While the schedule for meetings may vary in different organizations, our experience indicated that for the first three months of operation of the committee, semi-monthly meetings of one day each appeared to be desirable. After that, meetings were held once a month for two days.

These meetings included occasional inspection trips to see material which has failed unexpectedly in service or during installation, and to see local operations and construction and consider them for standardization.

Developing standards

The basic pattern for all standard urban structures was determined after consideration of (1) the loads to be served in residential urban areas during the life ex-

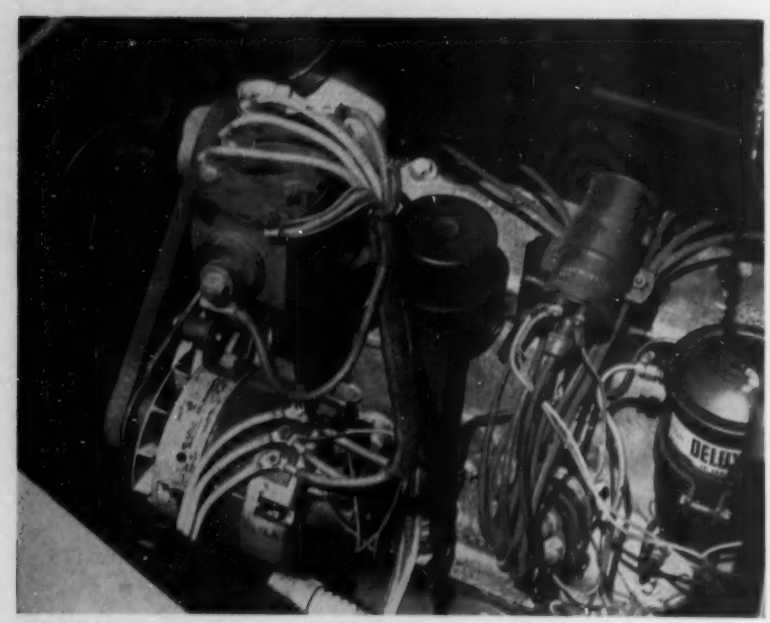
(Continued on page 131)



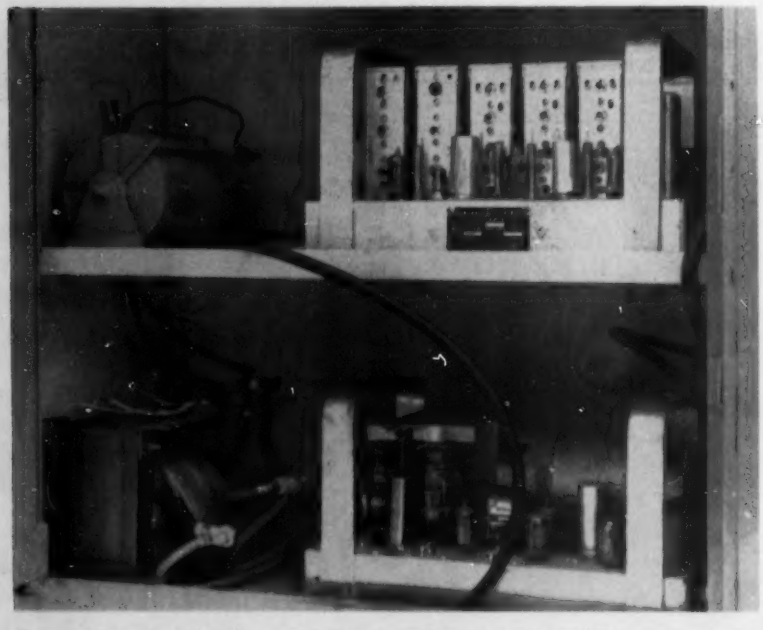
(Right) Study of proposed construction is facilitated by building "close to the ground" examples such as this for the Standards Committee to examine at their meetings.

(Below) At the "approval" meetings of the Distribution Standards Committee, members have an opportunity to examine each item and study reports on it.

Distribution practices improve



View of FP&L line truck motor showing the 3-phase generator, the 6.3 volt copper oxide rectifier, and circuit to step-up transformer.



Compartment on truck containing transformer and rectifier to step voltage up from 6.3 v. a-c to 115 v. d-c. At right, 2-way FM radio.

Increasing load density on distribution system adds to the need of improving service reliability. Florida Power and Light's distribution engineers have made some impressive gains in attaining this objective.

By W. H. Cole, Assistant Distribution Supervisor, Florida Power and Light Co., Miami.

◆ THE TROUBLE SECTION of the Miami Area Transmission-Distribution Department is responsible for maintenance of service and service restoration work in Greater Miami. This Greater Miami area is actually Dade County which contains 2,054 square miles, a population of 703,777 and 258,838 customers of Florida Power & Light Company. The population of the Greater Miami area has skyrocketed at the rate of 6½% per year since 1946, and service reliability has grown increasingly important!

Our Trouble Section has its headquarters in the Miami Electric Distribution Building located at 122 S.W. 3rd Street in the heart of Miami. From this central point, the trouble dispatchers, who are on duty 24 hours a day, seven days a week, control the activities of the regular troublemen working an assigned section of this large area.

The usual procedure after a call is received from a customer via the customer service board is for the dispatchers to send a troubleman to the scene. The troubleman investigates the complaint, handles the discrepancy, clears up any hazard, and relays this information back to the dispatchers.

When a crew of any kind is needed during regular working hours, the various work locations release personnel to the dispatchers. After regular working hours, the crews would normally be called out on overtime by the dispatchers, report to their regular work location and proceed to the job. At the

service

best, almost an hour is necessary for the crew to assemble and get to the job location.

Evening shift line crew

Our trouble supervisor, W. E. Wilson, advanced the idea of scheduling a crew to work a regular shift in the evening, to be on the job and execute our service restoration more rapidly. Considerable research disclosed that the majority of our call-outs after regular working hours were between 4:00 p.m. and midnight.

On January 23, 1956, a special line crew consisting of a working foreman, lineman, apprentice lineman, and winch truck operator, was put on to work the hours from 4:00 p.m. to midnight, Saturday through Wednesday. This special service crew operates from a regular line truck with a small two-wheel trailer for wire and bulky material. The chassis of this special truck is a 19,500-lb. GVW with a 5-speed direct and 5th transmission.

The conventional winch and the "A" frame fittings have been eliminated and replaced by a 6,000-lb. winch on the front bumper and a fixed roof section. The light winch is equipped with a capstan and a take-up reel, and the body is our "Florida Power & Light Special," similar to the standard 13-foot line construction body.

Of unusual interest is our method of supplying 110 volt d-c for portable tools, blowers, floodlights, etc. F. J. Norton, communications supervisor, and H. L. Allen, automotive equipment superintendent, are responsible for effecting this modern and useful improvement to our vehicles. A 3-phase Leece-Neville 100 ampere, 6.3 volt a-c generator is pulley-driven direct from the drive shaft of the motor in lieu of the regular truck generator. The 6.3 v. a-c, 3-phase, is fed to a 100-ampere copper oxide rectifier, the 6.3 v. d-c output of which is used for the vehicle ignition system and our standard two-way FM radio.

The output of the 3-phase, 6.3 v. a-c generator is fed also to a 3-phase transformer which steps up the 6.3 volts to 115 volts. This 115 volt, 3-phase, a-c is then rectified with a selenium bridge rectifier to produce 115 volt d-c output. The 6.3 volt d-c is regulated and provides constant output at the generator. The 115 volt d-c supplies polarized plugs at convenient locations around the truck. Portable 1000-watt floodlights have been used for illumination in service restoration at night and portable a-c/d-c hand tools have proved most useful. A 2.5 kw portable generator is available for use when

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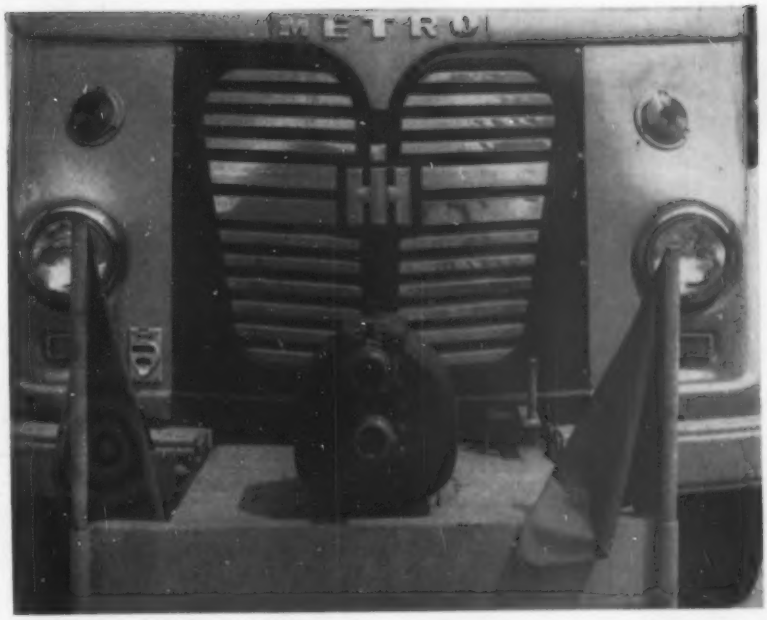


Detailed view of front of special cable splicer truck showing 10,000 gal/hr water pump. Also shown is polarized appliance outlet.

Underground trouble work is greatly facilitated with this special walk-in truck. Among special features is the front-mounted pump.

Distribution costs lowered with triplex secondary bus

Sustained tree trimming, triplex aluminum secondary bus, and a 9-ton mobile hydraulic crane, are among the means this utility company are using to make distribution system perform and look better while costing less.

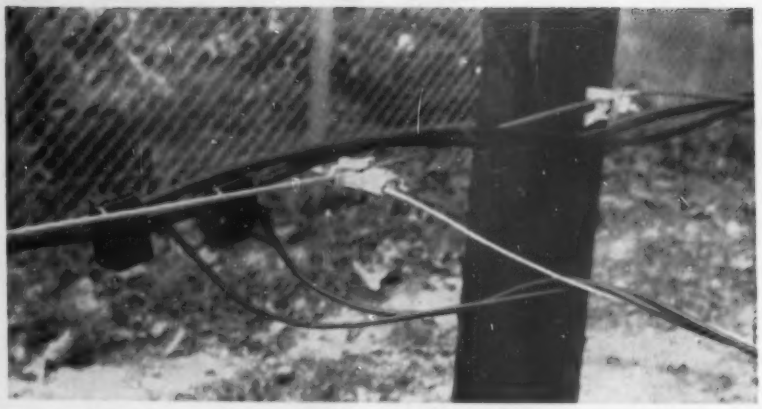
By A. A. Hall, Jr., Engineer, Electric Distribution Dept., Baltimore Gas and Electric Co., Baltimore, Md.

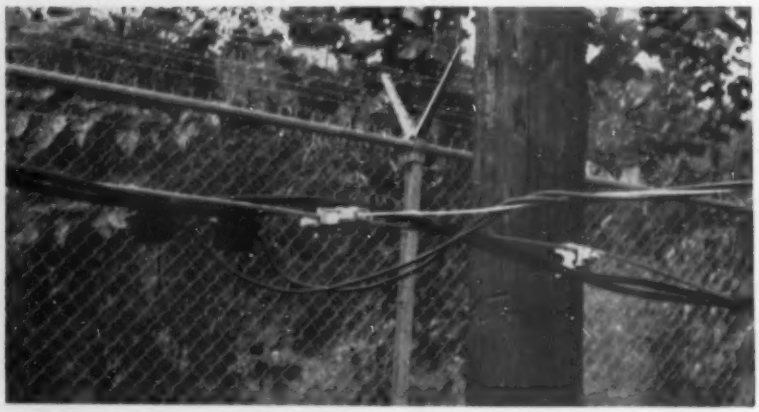
◆ MODERN DISTRIBUTION systems must perform better, look better, and cost less. Customers have more electrical equipment, and are therefore more "service conscious" than they have ever been in the history of the electrical business. When a residential customer loses service today, he is acutely aware of it because of his many electric appliances.

Sustained tree-trimming program contributes materially to reliability of service.

On the 4 kv system of the Baltimore Gas and Electric Company about half of the service interruptions are caused by trees. By trimming trees to obtain greater clearances between them and the lines, by providing wider pin spacing, and by using neoprene-covered, ACSR wire for its lines, the company has effected a considerable decrease in the number of storm interruptions.

In areas where permission to trim trees cannot be obtained, the use of aerial cable promises to give greater freedom from storm trouble than any other measure except the use of underground construction. Primary conductors have been arranged in a triangular pattern in many cases with the hope that at least the smaller tree branches will slide off the wires rather than remain there and cause "burndown."





These views show an installation of aluminum triplex secondary bus at working height for purposes of crew instruction. Note service tap made with newly developed connectors which require no taping.

Triplex secondary costs less, presents better appearance, and promises better performance.

A recent trial installation made by the Baltimore Gas and Electric Company of aluminum triplex secondary bus has shown its advantages of lower cost, simpler construction, and potentially better appearance when compared with open-wire secondary bus.

The overriding factor in the cost comparison was a 30% reduction in installation time—and this was the *first* installation. It is safe to assume that as the crews become more experienced in working with this new conductor, installation time will be further reduced.

This installation was made in a medium-priced housing development consisting of split-level and ranch-type houses. Since each house was equipped with an electric range in addition to the usual appliances, it was initially felt that an open-wire bus made up of #3/0 ACSR wires would be necessary in order to avoid excessive voltage drop. It was subsequently found that #3/0 aluminum triplex, together with a #1/0 ACSR mes-

(Continued on page 127)

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Hartford, Conn.

"Our dealings with Day-Brite have always been very satisfactory.

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Determining economical size for 12.5 kv substations

Many complex variables enter into the determination of the most economical size of distribution substation for serving a given area, but valuable guiding information can be obtained by choosing basic assumptions and then developing comparative costs in dollars per kva for substations with various numbers of feeders.

By J. A. Smith, Engineering Planning and Development, General Electric Co., Schenectady, N. Y.

◆ THE DETERMINATION of the most economical size of distribution substations is complex because of the many variables involved. In addition to the cost of the substation equipment, these variables include the cost of H. V. and L. V. lines, real estate, right-of-way, load density, rate of load growth, physical configuration of the load area to be served and existing facilities.

Because of these many variables and their inter-relation it is not possible to study any one item alone without recognizing the effect that changes in this item have on the others. Neither can the conclusions reached, as based on one set of conditions, be used universally. It is helpful to establish an understanding of the relations between the most significant items. With these relations established, the effect of other variables can then be introduced.

It is generally agreed that the best way to establish basic relations is to simplify the problem by assuming ideal and uniform conditions. The results and relations thus established must then be "tempered" by the actual conditions which do exist. In some cases such an idealized study will permit immediate selection of the right answer to a specific problem. In other cases, it may serve to establish guide-posts by which many alternates can be eliminated and a more detailed study can be made of only two or so remaining plans.

It is the purpose of this paper to demonstrate the basic relations which affect the choice of economic sizes for 12-kv distribution substations.

The determination of the most economical size distribution substations for serving an area of given load density is a study of the cost relations between the following three parts of the system:

Basic variables

(a) The distribution substations
(b) Subtransmission lines that feed the substations
(c) Primary feeders that the substations supply

This means that if substation cost in dollars/kva of load were constant regardless of size and voltage, then the economical substation size would be a function of the cost relation of subtransmission and primary express feeders. This assumption of constant substation cost is obviously not correct, but may be approximately so within limited voltage and kva ranges.

A more realistic method of studying the relations affecting substation size is to consider the cost of subtransmission, substations and primary express feeders to serve uniform areas of different load densities. Uniform areas large enough to permit several sizes and locations of substations should be used. Total costs within the load area are considered. Initially, the power is assumed available at the edge of the load area at any of the subtransmission voltages to be studied. Later the cost of distance covered up to the edge of the load area and the relative cost of making the power available at the different subtransmission voltages must be included.

It is first necessary to establish 12.5-kv feeder loadings, feeder layouts or configuration, and "feed points."

Determination of feed points

The limitation on maximum load that can be served from one feed point may be voltage drop to last customer, thermal limit of 12-kv conductor or some more arbitrary limit such as maximum kva per feeder, maximum area or maximum number of customers. In general, 12-kv is not "voltage limited", but is limited by the load per feeder established by one of the latter criteria. We will initially assume a maximum feeder loading of 6000 kva per feeder. In addition, the effect of a lighter feeder loading on the economical sizes of substations will be examined at the lighter load densities.

Some reasonable method of determining the physical boundaries of our ideal 6000-kva feeder must be established. They could be assumed square, rectangular, etc. However, why not assume them to be laid out for minimum voltage drop at some initial density, of say 1000-kva/square mile? If mains are 336.4 mcm aluminum and laterals are 1/0 aluminum, then minimum voltage drop in a rectangular load area is obtained when the main is 0.68 times the length of lateral.

As load density increases the area covered by the feeder must be reduced to keep the feeder load to 6000-kva per feeder. This is done in steps and the assumed feeder layout is shown at 2000, 4000, and 8000-kva/square mile.

It is desirable to determine the cost of different sizes of substations including the cost of H. V. and L. V. circuits associated with each size substation. This is done by comparing the cost of serving an area by one large substation or serving the same area by combinations of several smaller substations.

In this study, load density of 1000, 2000 and 8000-kv per square mile will be studied so that the ef-

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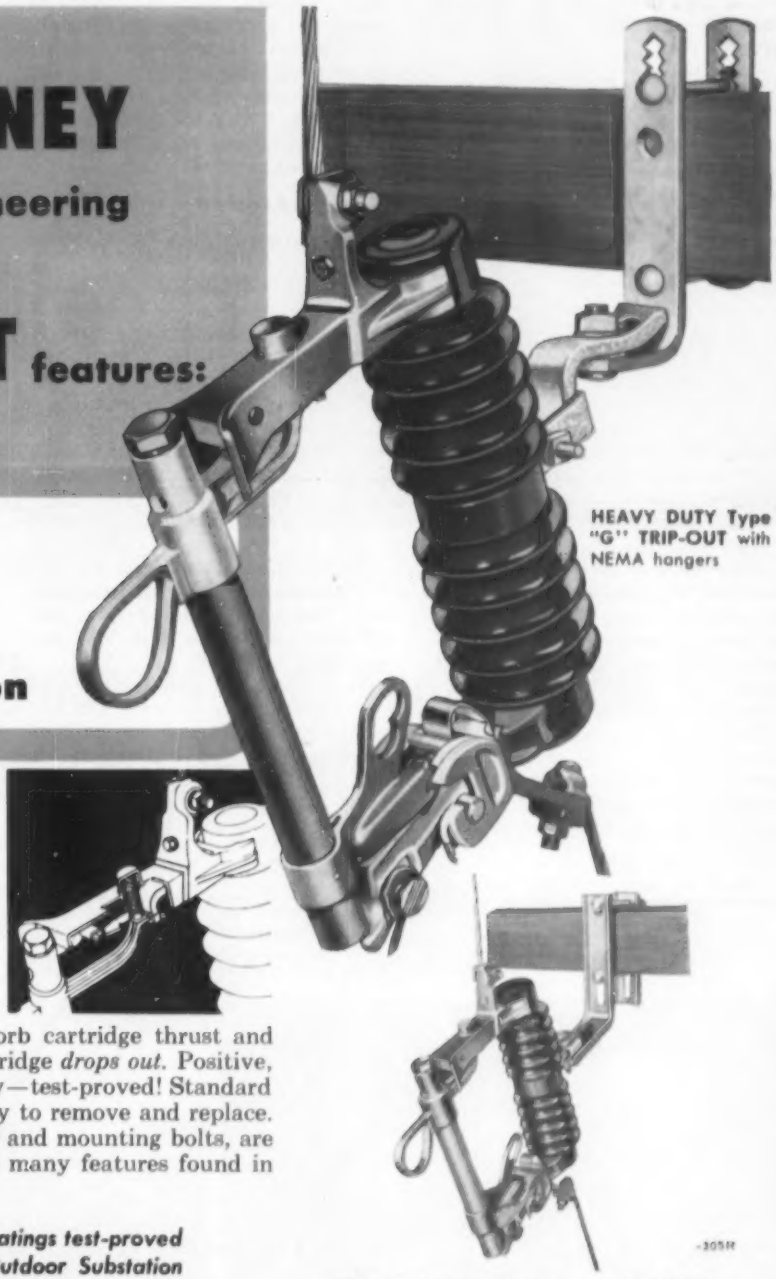

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fect of load density on economical sizes of substations can be observed.

Variables and assumptions

Subtransmission of 69 and 138-kv will be considered. It is assumed that power is available at either voltage at the edge of the load area. The cost of lines and losses for carrying two radial circuits from the edge of the area to each substation will be included. In other words, the subtransmission costs only within the area will be included. Differences in cost of making the power available at these two voltages and for covering the distance from source to edge of load area must be added in order to apply the results to any practical case.

The substation arrangements studied are two transformer substations with sectionalized 12.5-kv bus allowing grouped bus regulation with not more than four feeders per bus section. Under the assumed ideal conditions, feeders of equal length can be grouped together on each bus section.

Each substation is served by 2-69 or 2-138 kv circuits with throw-over on the 12.5 kv side to automatically pick up all load in case of H. V. line or transformer outage. Tranformer sizes are all based on carrying approximately 20% above the top rating during emergency. This actual value is not of significance so long as it is consistent since only the relative costs of the different substation sizes are to be compared.

Assumed costs

The assumed costs used are as follows:

Line cost—in dollars per circuit mile, all overhead, with cost of double circuit line as twice the cost of a single circuit line. These costs could include only a moderate amount of right-of-way cost. Conductor sizes are AL or ACSR.

12.5 kv, 336.4 mcm, $10,000/mile
69 kv, 366.4 mcm, $18,000/mile
69 kv, 556.5 mcm, $20,000/mile
138 kv, 366.4 mcm, $23,000/mile
138 kv, 556.5 mcm, $25,000/mile

Installed substation cost including foundations, rigging, grading, etc., but not including any significant real estate cost, was assumed to be as follows:

Transformers = equipment cost + 15%.

12.5-kv switchgear = cost of outdoor metalclad switchgear + 50%.

69 or 138-kv incoming line switchgear = cost of switches, L.A., steel work, and insulators + 100%.

Cost of losses were assumed as follows: I^2R loss — $200 per kw; core loss — $350 per kw. This approximates a $20.00 per kw demand charge and 4 mils per kwhr energy charge at 50% load factor and capitalized at 15%.

These assumed costs are different than exist on many systems; however, the results are shown in such manner that each item of cost can be easily adjusted to more nearly reflect actual conditions. The actual values shown in the results are not as important as the relationship found between the various items.

Results for 6000-kva feeders

Figure 1 shows the manner in which the results are presented. This is for 1000-kva/square mile load density and similar curves will be discussed for 2000 and 8000-kva/square mile.

The total costs for subtransmission, substations and express feeders within the area have been totalled and plotted on the vertical scale vs. size of substation on the horizontal scale. Similar data is presented twice, one for 69-kv and again for 138-kv subtransmission.

This data is best thought of as

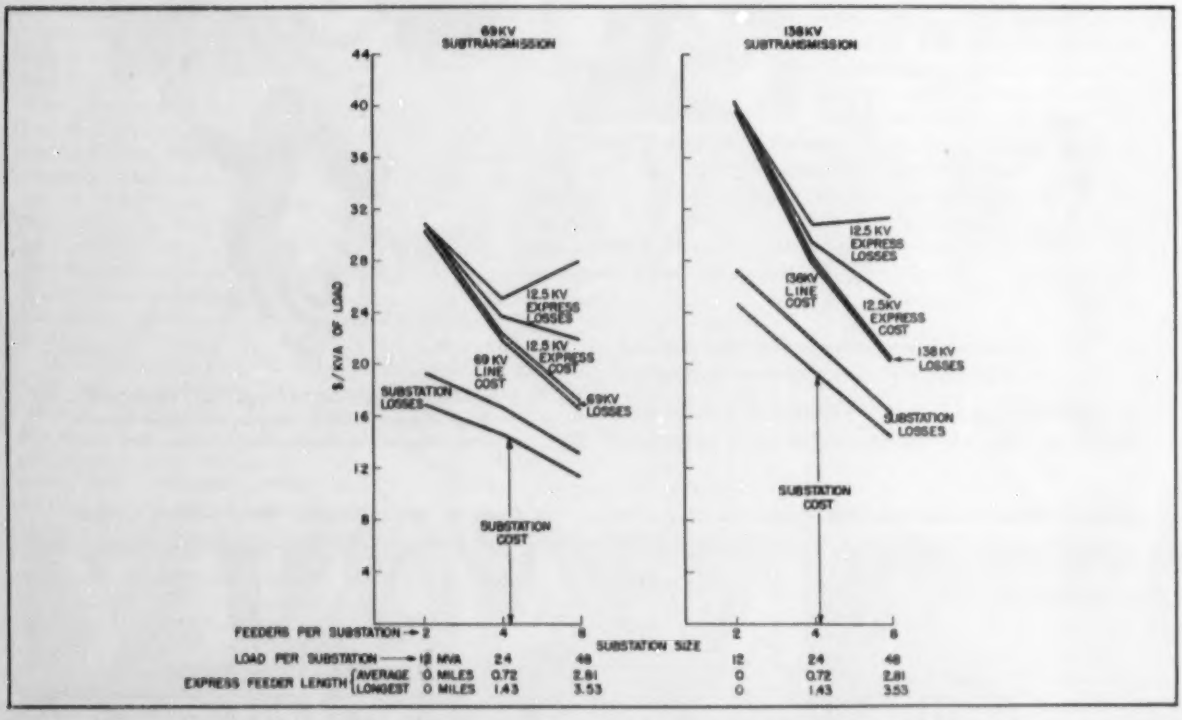

Figure 1 — Total cost of subtransmission, substations, and 12.5 kv express feeders for serving an area having a load density of 1,000 kva per square mile, and utilizing feeders of 6,000 kva total capacity.

A V2JS VOLTMETER-WATTHOUR METER COMBINATION permanently installed at first or last customer from the transformer. Regular meter reader reports minimum and maximum voltage to Engineering Department.

COMPLETE TEST SET checks load and voltage at customer's premises —gives full information on circuit conditions at input to customer service, while continuing to record KWH consumption.

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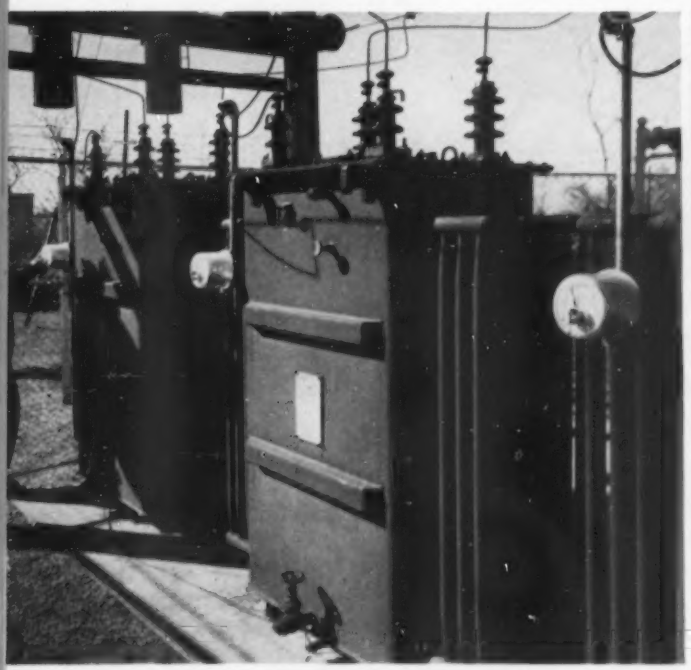
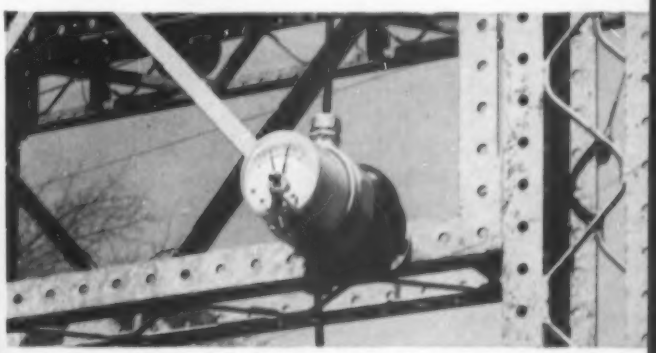
Indicating meters provide the low-cost way of obtaining complete knowledge of your system. They give continuous data of load, balance, and current values—on transformers, on feeders, at substations, at system check points. Lincoln Indicating Meters are simple in design and operation—flexible in application. Use the coupon below for detailed information on these economical aids to system betterment.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois



LINCOLN ADN AMPERE DEMAND METERS, tied solidly in to the neutral, provide continuous knowledge of load and balance on 4WY banks of transformers. No instrument transformers are required.



THIS "HOT" TYPE AD-5 LINCOLN METER indicates amperes and gives balance on primary feeder circuits. Meter is insulated from ground with a post-type insulator and is arranged for hot stick reset.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois

Please send me the information checked below:

- ☐ Information on Lincoln Voltmeters and Ammeters.
- ☐ Bulletin on Test Sockets.
- ☐ Booklet: "Solving Distribution Problems through Measurement."

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SM56-6

the total cost of delivering power from the edge of the load area to the feed points. The cost of 12-kv mains and laterals to cover the area from the feed points are not included. For all practical purposes they do not change regardless of whether power is brought to the feed point by a substation at that location, or by an express feeder from a more remote substation.

Each item of cost is shown as an individual band so that the effect of changing substation size can be observed. For example, at 69-kv subtransmission, the installed cost of a two feeder 12-mva substation is approximately $17.00/kva and decreases to about $11.50-/kva for an eight feeder 48-mva substation. The substation transformer losses remain almost constant at about $2.00/kva. The cost of 69-kv lines to reach from the edge of the load area to four smaller two feeder substations is nearly $11.50/kva and decreases to $3.50 per kva to reach only one eight-feeder substation. The 69-kv circuit losses are not significant.

All items of cost so far have decreased with increasing substation size. However, the 12.5-kv express feeder cost and losses increase rapidly with substation size and therefore determine the most economical size substation for a given set of conditions. The two feeder substations are located right at the feed points and have no express feeders. For the four feeder substation, the average length of express feeder is 0.72 miles, representing a cost of about $2.75/kva for line cost plus losses. For an eight feeder substation the average length of express feeder increases to 2.81 miles, representing a cost of nearly $11.00/kva.

The top line represents the total cost within the area up to the feed points. It is about $31.00/kva for two feeder substations, decreases to $25.00/kva for four feeder substations and because of the long express feeders increases to $28.00 for an eight feeder, 48-mva substation. The use of four feeder substations consisting of two transformers each rated 12/16/20-mva is therefore the most economical arrangement we have considered to serve a uniform area of 1000-kva/square mile using 6000-kva/feeder loading.

The right-hand set of curves gives the same data for 138-kv subtransmission. The four feeder substation is still the most economical; however the use of eight feeder substations now costs less than $1.00/kva more. Looking at the various components of cost it can be seen that this is due to the cost of the substation equipment decreasing more rapidly with increasing size at this higher voltage.

Figure 2 shows similar data for a load density of 2000-kva/square mile. Substation sizes cover the range of two to sixteen feeders.

At 69-kv the four and eight feeder substations are practically a stand off in total cost; at 138-kv the eight feeder is least expensive. Again, the higher subtransmission voltages favor the use of larger substations.

Increasing the substation size beyond eight feeders indicates that the substation cost continues to decrease at twelve feeders, but that a sixteen feeder substation costs the same in $/kva as the eight feeder. The twelve feeder arrangement makes more efficient use of transformer capacity by paralleling the two remaining transformers when one is out of service. This of course means that short-circuit duty on the feeders is quite high under this condition and that all twelve feeders have the same voltage at the substation bus.

For the sixteen feeder arrangement it is less practical to parallel transformers with one out of service and therefore a sixteen feeder arrangement is essentially the same as two eight feeder substations located at the same site. This represents the general condi-

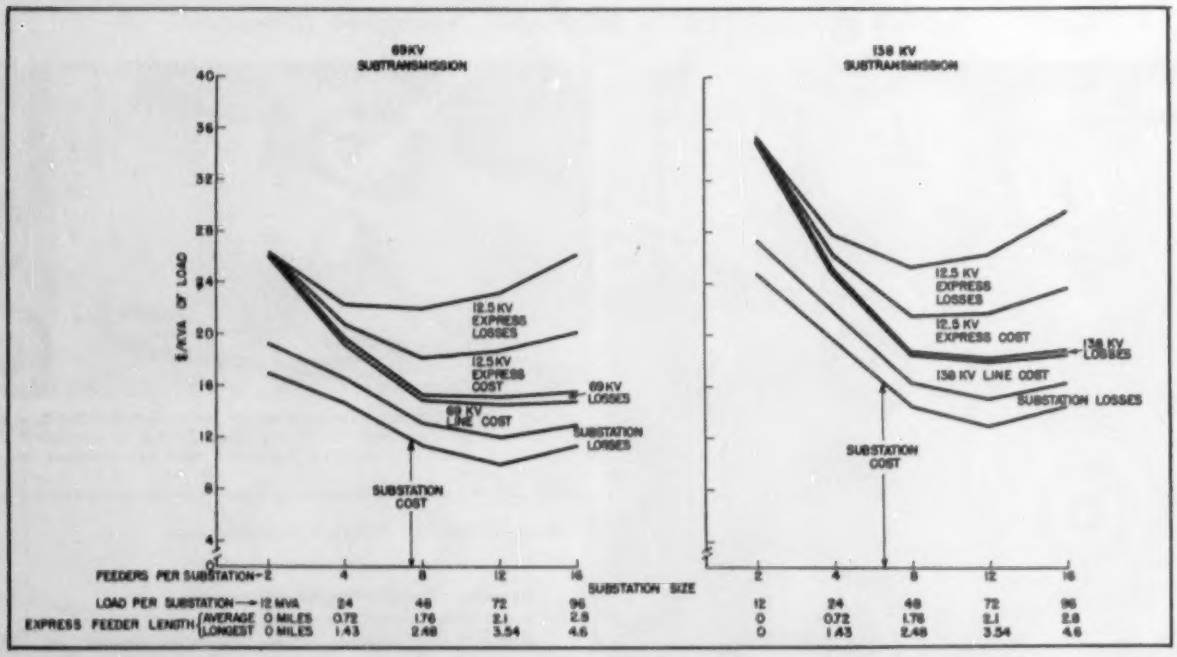

Figure 2 — Total cost of subtransmission, substations, and 12.5 kv express feeders for serving an area having a load density of 2,000 kva per square mile, and utilizing feeders of 6,000 kva total capacity.

ELECTRICAL ENCLOSURES STEEL or

required.

CITY_____ STATE_____

SM56-6

Sikorsky Aircraft's "Plant of the Year"

WIRE BY PHELPS DODGE

This spacious new helicopter plant recently built by Sikorsky Aircraft, division of United Aircraft Corporation in Stratford, Conn., covers nearly 18 acres and can easily be expanded to meet future production needs. A model plant in every respect, it has been cited by *Factory Management & Maintenance* as one of the top ten in the nation for 1956.

One of the requirements for this outstanding Sikorsky plant was an electrical system of the highest quality. That's why Phelps Dodge building wire and cable were installed.

On every wiring job where top-quality performance, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge distributor!*

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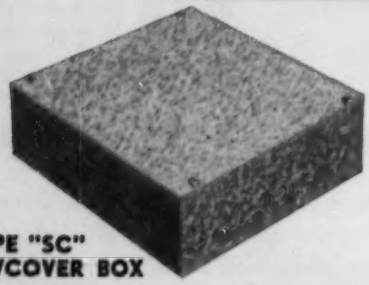
CABINETS AND BOXES

TYPE "PF" TELEPHONE CABINET

Surface or Flush Mountings in either galvanized or grey enamel finish. Constructed from the finest steels available, all in compliance with the Underwriters Laboratories specifications.



TYPE "SC" SCREWCOVER BOX

Durable Formed Construction, galvanized or grey enamel finish, with or without knockouts. Sizes to your specifications.

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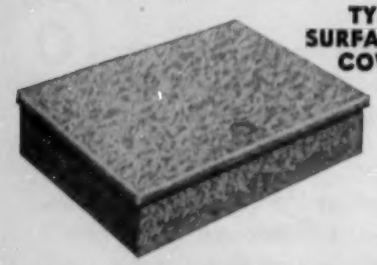

All sizes available for electrical cutouts, switches, relays, junction and pull box applications, galvanized or grey—with or without knockouts.

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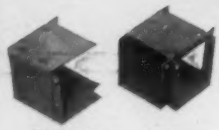
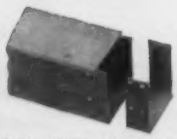
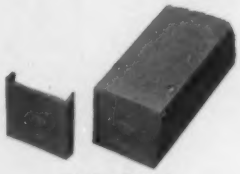
TYPE "SD" SCREW COVER AUXILIARY GUTTERS



ELBOW and TEE



"U" CONNECTOR



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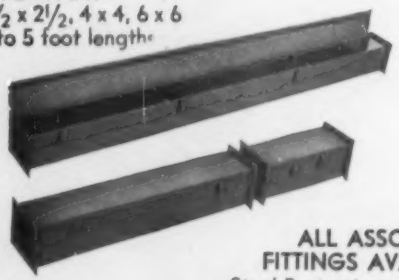
For Switches, Panel Boards or Straight Runs, you can't match the flexibility, greater capacity and easy installation of B&C wireways. Die formed construction of heavy gauge sheet steel, as specified by the Underwriters Laboratories and the National Electrical Code.

HINGED COVER WIREWAYS

TYPE "HCW"
2½ x 2½, 4 x 4, 6 x 6
1 to 5 foot lengths



ALL ASSOCIATED FITTINGS AVAILABLE

Steel Protection of Electric Conductors, plus Accessibility.

Economical to install and maintain — tapping, splicing, additions, inspections, may all be made within the limitations of the National Electrical Code.

Write for descriptive catalog containing installation data and price list.

B and C

Your Seal of Dependability and Safety

METAL STAMPING COMPANY

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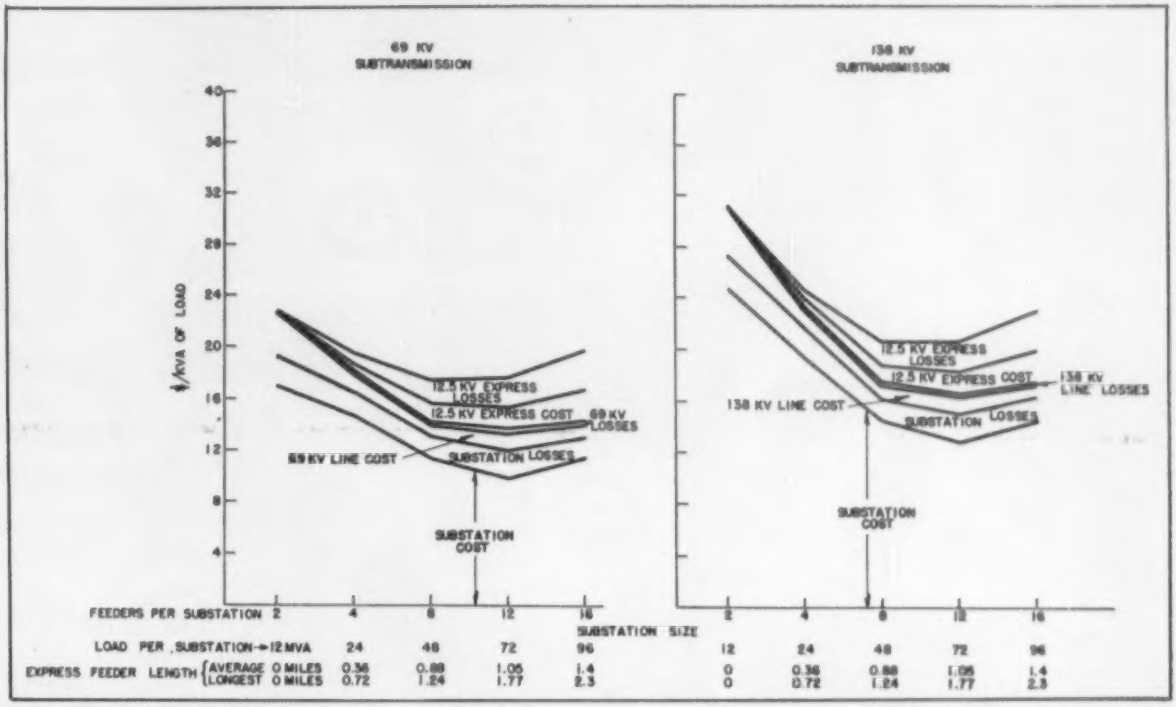

Figure 3 — Total cost of subtransmission, substations, and 12.5 kv express feeders for serving an area having a load density of 8,000 kva per square mile, and utilizing feeders of 6,000 kva total capacity.

tion that substation cost does not, in the practical case, continue to decrease indefinitely with increasing size. When this "saturation" is reached and little or no additional saving in substation cost is realized in going to a larger size, there is little chance of decreasing subtransmission cost being sufficient to offset the continually increasing cost of longer express feeders.

Figure 3 is for a load density of 8000-kva/square mile. Again substations of two to sixteen feeders are considered. The use of eight feeder substations results in the minimum total cost at both 69 and 138-kv; however there is little difference between eight and twelve feeders.

6000-kva feeder conclusions

The following conclusions can be obtained by inspection and comparison of Figures 1, 2, and 3.

(1) It appears that the most economical sizes of substations for serving 12-kv overhead distribution fall in the general range of four feeders at 1000-kva/square mile; four to eight feeders at 2000-kva/square mile; and eight to twelve feeders at 8000-kva/square mile.

(2) Where a range of sizes is indicated in the preceding paragraph the use of 69-kv subtransmission favors the use of the smaller substations, the use of a higher subtransmission voltage such as 138-kv favors the use of the larger substations.

(3) This study considers uniform conditions and compares the costs of installing all equipment and lines at one time to serve a given load density. This does not take into account such things as non-uniformity, rate of load growth, or maximum utilization of existing facilities etc. However, it does serve as a guide to the effect of subtransmission voltages and load density upon the most economical sizes of substations.

(4) There are many items of a practical nature that tend to prevent using some of the larger eight to twelve feeder substations of 48 to 72,000-kva which are indicated to be economical for the higher load densities. These include:

(a) Many areas served at 12-kv are not presently large enough geographically to have a total load equal to the capability of even one of these larger substations.

(b) Discontinuities and non-uniformity caused by rivers, parks, etc. prevent reaching so much load from one substation site.

(c) Rate of load growth may be such that advantage cannot be taken of the decreasing cost of substation equipment with size. In these cases smaller size power transformers and substations must be installed in steps to prevent false economy due to having low cost per installed kva of capability but high cost per kva of load being served over long periods of time.

(d) The practical problem of group regulating four or more feeders together may require the use of individual feeder regulators on the larger size substations. The added cost of individual feeder regulators over grouped bus regulation will make the larger sizes less economical.

(e) Higher short-circuit duty inherent with larger sizes of substations may require feeder reactors or more expensive higher interrupting duty fuse cutouts on feeders.

(f) Congestion and longer cable risers to get eight or more feeders away from the same site.

(g) Longer express feeders inherent with larger stations means some reduction in service continuity.

(5) Other items may favor substations larger than indicated

(Continued on page 126)

and Safety

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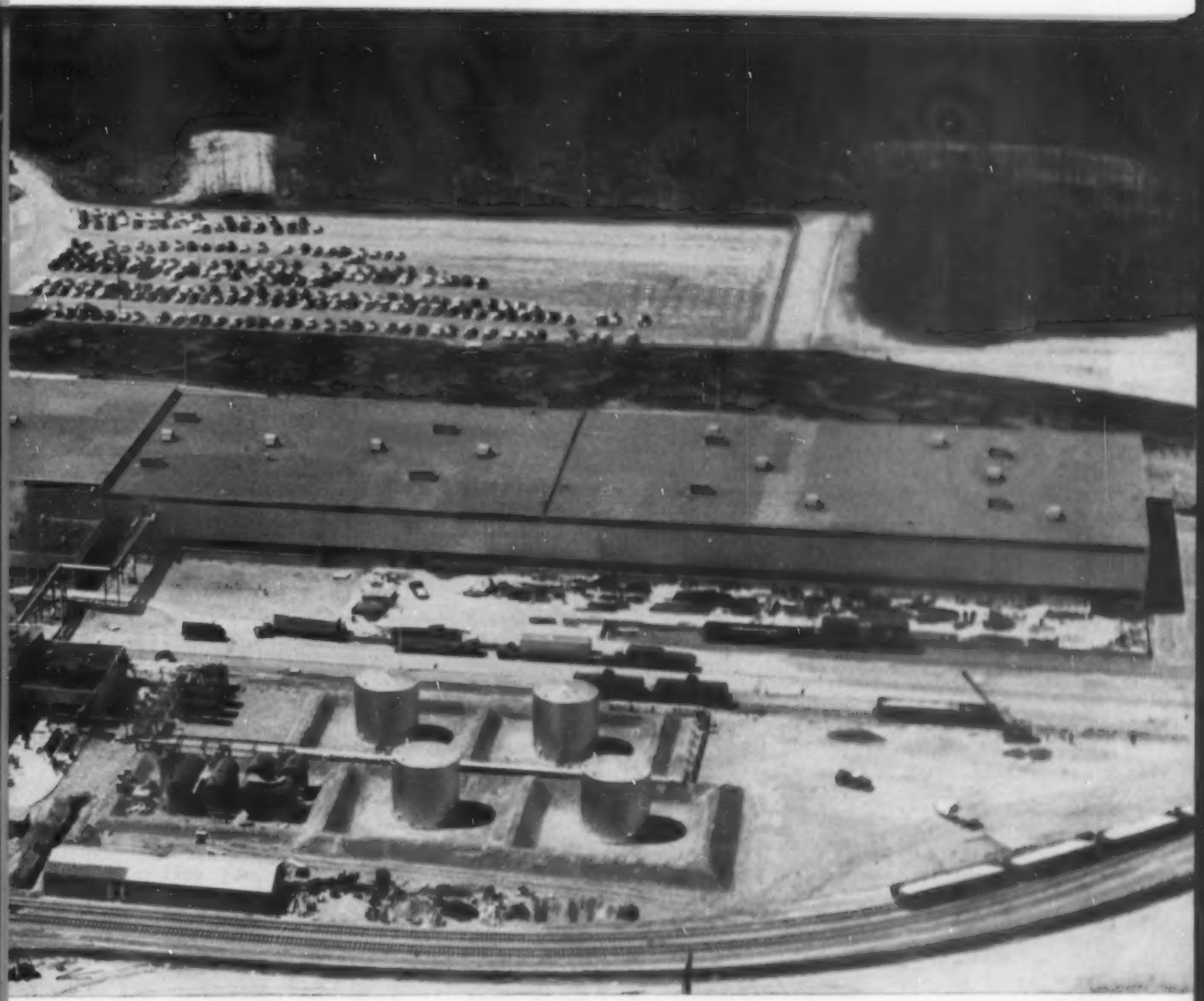
New General

G-E Conventional and Self-protected Distribution Transformers



Electric Transformer Plant

A progress report on construction at Hickory, N. C.

Early in 1955, ground was broken for a new General Electric distribution transformer plant near Hickory, N. C. Major construction has now been finished and machinery is being installed. Limited production has already gotten under way.

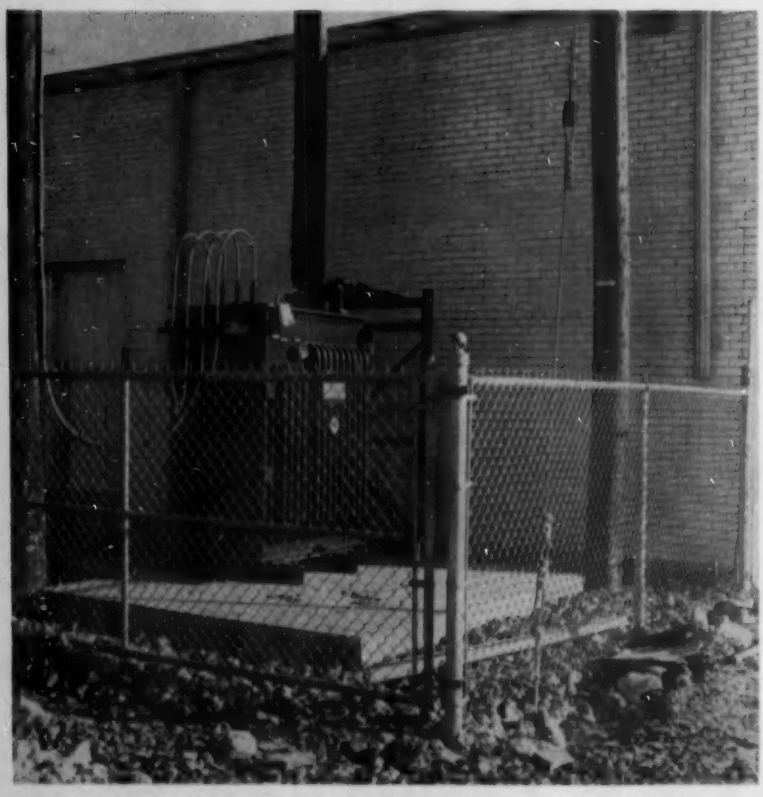
With the increase of industrialization and construction in the South, there is a greater demand for electrical distribution equipment from utility and industrial users. By locating this plant in the South, General Electric will be able to provide even better service on distribution transformers to Southern customers.

Eventually about 1000 people from the Hickory-Newton-Conover area will be employed at the new plant. This will be the second major transformer plant General Electric will have operating in the South. A Medium Transformer Plant was opened in Rome, Georgia, in May, 1954. Both of these plants are General Electric's answer to the booming electrical industry in the South. General Electric Company, Schenectady 5, N. Y. 431-47

Progress Is Our Most Important Product

GENERAL ELECTRIC

Power for shopping centers



A modern compact power unit (three or four single-phase transformers in one tank) makes a neat outdoor installation for a shopping center.

Modern shopping centers and their special problems point up the need for improved methods of supplying electrical power.

Some older methods are no longer acceptable in today's scheme of architecture.

By F. E. Sauerburger and J. C. Gass, Application Engineers, Allis-Chalmers Mfg. Co., Pittsburgh, Pa.

◆ SHOPPING centers are appearing at a tremendous rate throughout the United States and represent heavy concentrations of electrical load. It is desirable to supply the electrical power to these centers in such a way that consideration will be given to several factors:

1. Installation cost
2. Appearance
3. Installation space
4. Flexibility

The above requirements are best met by power units consisting of three or four single-phase transformers in one tank. In addition to the normal transformer elements, both current and potential

transformers may be installed in the same tank with secondary connections terminated in a junction box on the main cover.

Primary protective links can also be provided inside the transformer tank. These may be sized to afford protection in two ways:

In one instance they can be sized to open only in the event of fault in a transformer winding thus protecting the distribution system against lockout.

In an alternate scheme, the links can be sized to open in the event of abnormal overload to prevent damage to transformer windings from overheating.

Local operating practice will indicate the best method for a particular installation.

Installation costs

Since the power unit can supply three-phase or a combination of three-phase and single-phase power, major connections are simplified. Primary and secondary buswork required with separate single phase transformers is eliminated. This work is performed at the factory in building the transformers.

Further work simplification results when metering transformers are factory installed in the transformer tank. Both current and potential transformer secondaries are terminated at a sealed compartment on the transformer cover. This eliminates the need for separate sealable enclosures and wiring for metering.

Primary entrances are available in standard bushings as well as in wiping sleeve arrangements. Secondary bushings are normally cover mounted for ease of installation.

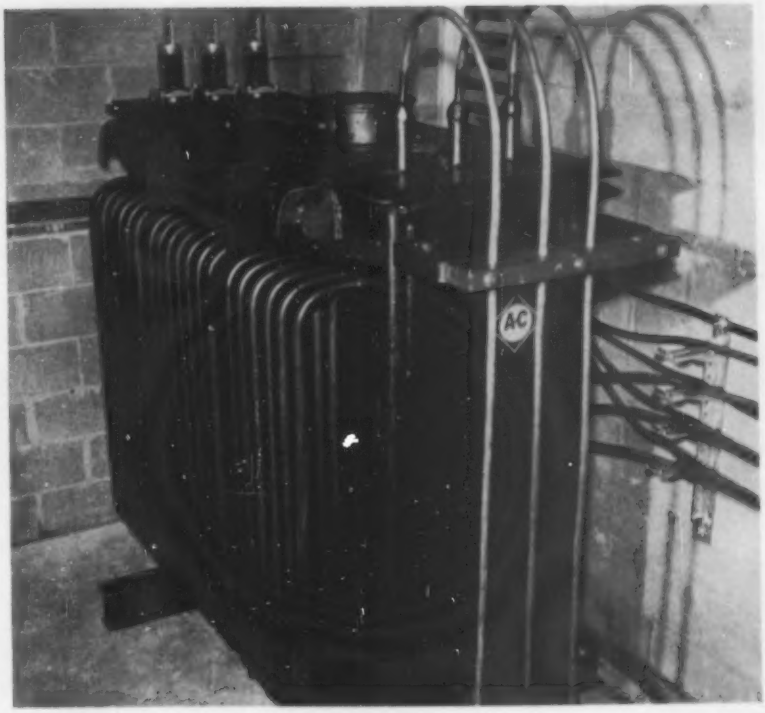
Appearance factors

The new shopping centers are designed not only for efficiency but also for modern pleasing appearance. The appearance does not stop at the facade or interiors. The service facilities contribute to the overall appearance of the center. The modern power unit with its compact, uncluttered simplicity blends well.

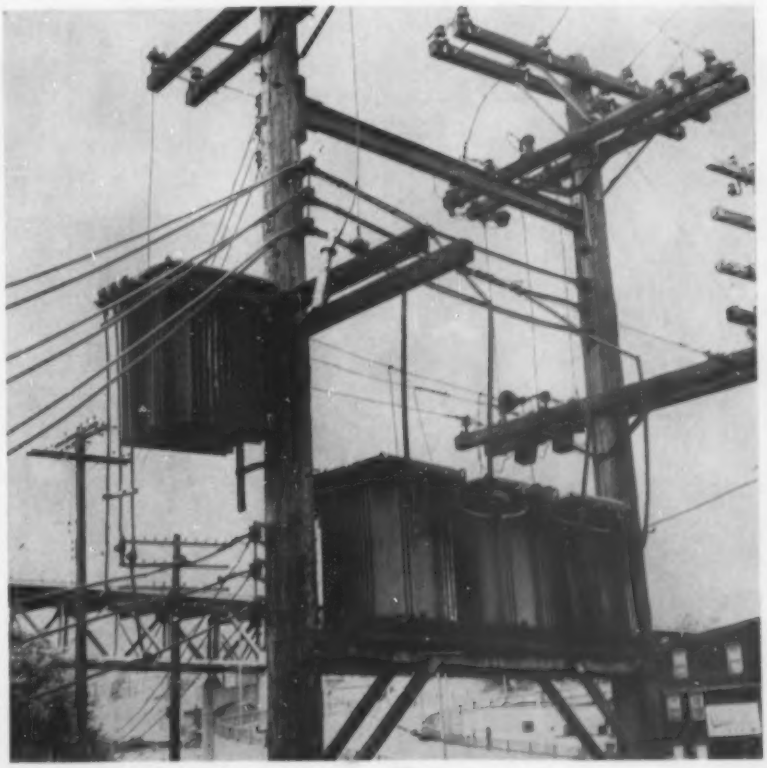
Installation space

Space for electrical service facilities is normally available at a premium. The large space required for a conventional transformer installation is reduced by the use of a compact all-in-one unit. This is particularly true when the installation is made indoors.

(Continued on page 124)



This vault installation shows economy of space attained when power unit is utilized. Metering transformers can be installed in the same tank, as well as primary protective links.



Old methods of serving large commercial units such as this one are no longer acceptable in the modern scheme of today's architecture.

Now, a luminaire that operates in freezing temperatures!

The new Westinghouse LT operates in low or variable temperatures—making it ideal for lighting cold storage warehouses, food lockers, shipping platforms and marquees.

Designed in cooperation with the Refrigeration Institute, the Westinghouse LT luminaire gives low heat output and high light output. A clear, ribbed plastic enclosure protects the lamp from air currents to insure maximum efficiency of the F72T-12, 100-watt, rapid-start lamps. In addition, the LT's porcelain finish resists corrosion in moist atmospheres and enhances its appearance. Why gamble with fixtures that were designed for other purposes.

Doesn't the LT suggest an application to you?

For real lighting quality, specify the Westinghouse LT luminaire.

See your Westinghouse distributor or write, Westinghouse Electric Corp., Lighting Div., Edgewater Park, Cleveland, Ohio.

Look for other new Westinghouse lighting products . . . soon to be announced!

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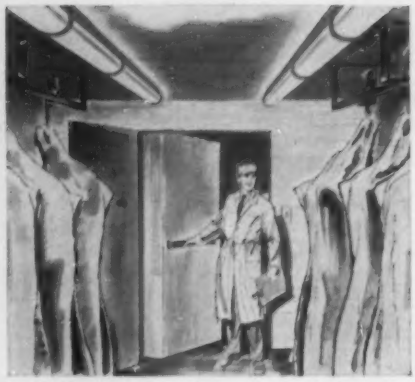
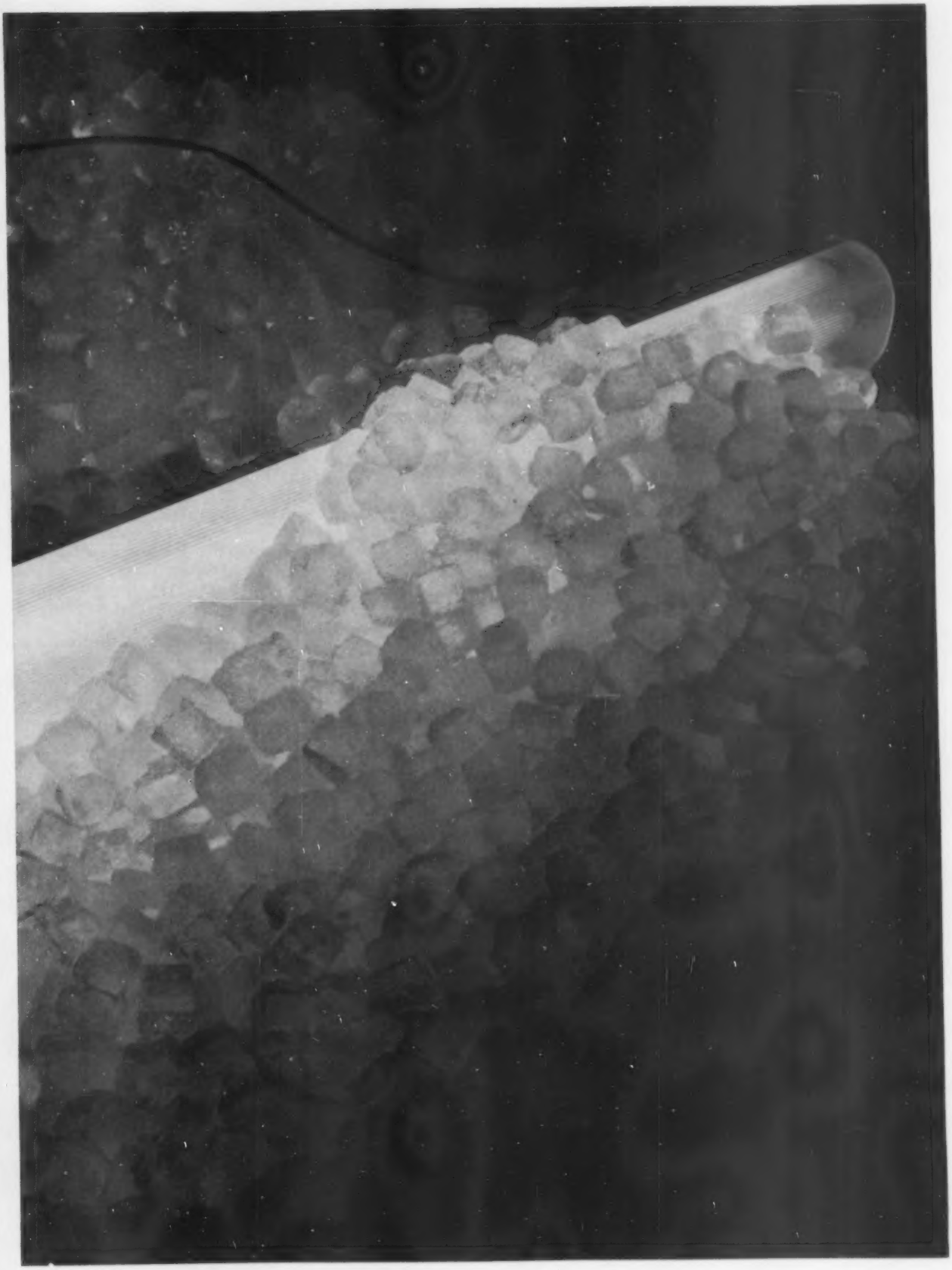


WATCH WESTINGHOUSE *WHERE* ***BIG*** *THINGS ARE HAPPENING FOR* ***YOU!***



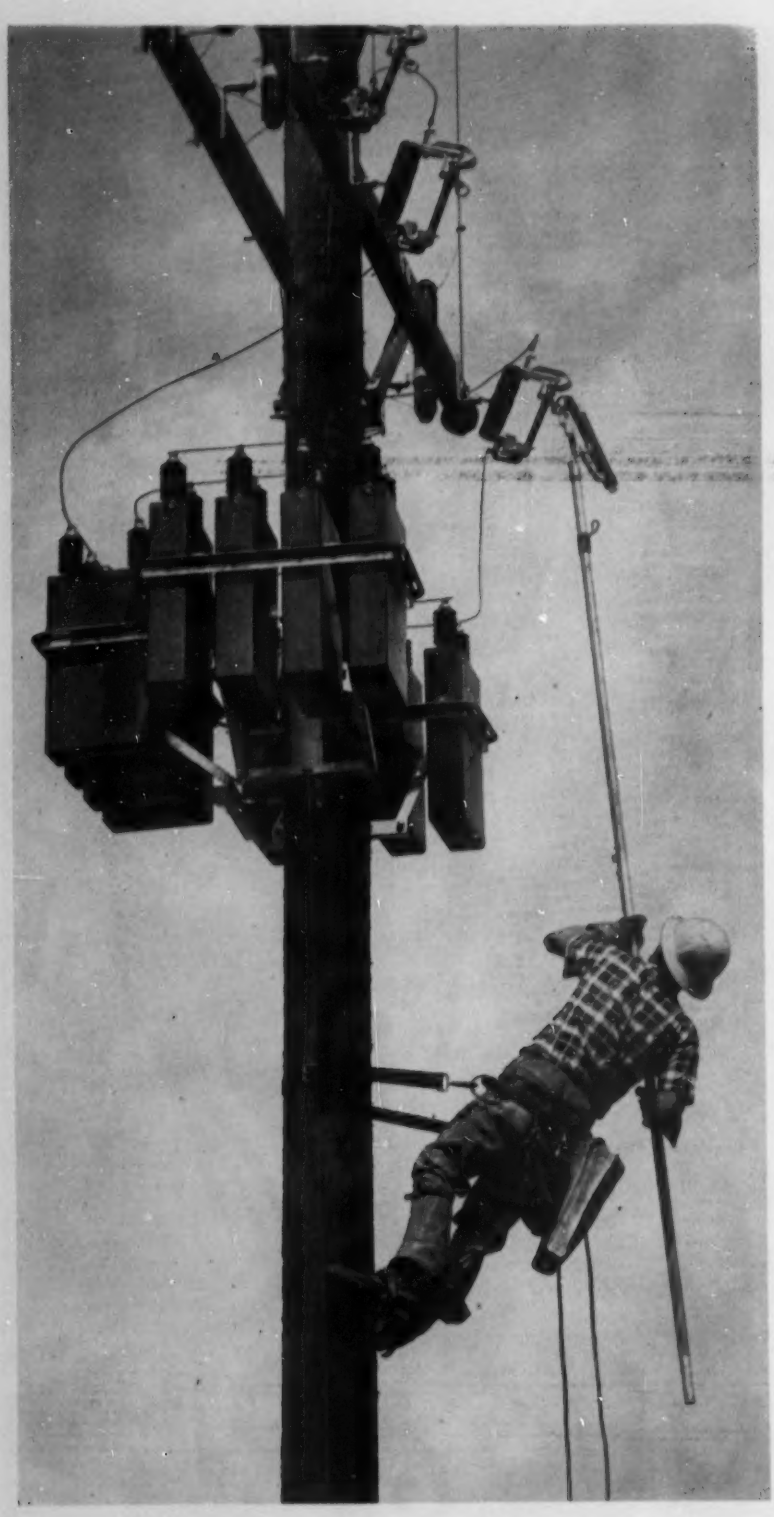
New tool

A unique portable loadbreak tool converts disconnects and cutouts into load interrupters for distribution load switching at low cost and without danger to the operator.

◆ A PORTABLE loadbreak tool, known as Loadbuster, which can be carried conveniently on utility line trucks and applied instantly to any S&C disconnect or cutout on a distribution system to break load current, has been announced by S&C Electric Company, Chicago. By means of this tool, which may be used over and over again, every disconnect and cutout on a system may be operated as a load interrupter switch.

Complete safety is afforded the lineman performing the opening operation, since there is no external arc resulting from the load interruption. The cost of providing this universal load interrupting facility is held to a bare minimum, since one Loadbuster has the repetitive capability of opening load currents with any number of switching devices.

For many years switching of high-voltage circuits has been a major utility operating problem.



S&C's Loadbuster, in actual service, is simply hooked across the upper contact of an S&C cutout which is then opened in the normal way to switch a pole-top capacitor bank. There's no arc, no link breakage, no fuss, no worry, no contact burning, and no danger to the operator. The high interrupting capability of Loadbuster permits load breaking even when the cutout carries the 200 ampere disconnect blade.

Closeup of the revolutionary Loadbuster tool which introduces an entirely new concept in distribution system load switching.

for load switching

The only positive way of doing it was with the circuit breaker or oil switch. Since these had to be excluded from many switching duties because of cost, other switching techniques were improvised. Group operated disconnects or horngaps were used extensively for certain types of switching, although they have never been given a definite interrupting rating. Limitations of these improvisations are well known in the industry.

The first attempt to substitute an inexpensive but positive switching device for the circuit breaker was in 1923 when S&C added an auxiliary interrupting feature, a liquid fuse of small ampere rating, to its disconnect switch. When the switch blade was opened, the load current was shunted through the fuse, blowing it and interrupting the circuit safely without an external arc. While this was a notable step forward, the necessity for replacing a blown fuse after every operation made it obvious that repetitive capability had to be built into any high-voltage switching device for it to be generally adopted.

Load interrupter developed

The next noteworthy step came several years later when S&C introduced the interrupter switch, or load interrupter, which is a conventional disconnect carrying a built-in interrupting unit. This device performs the circuit interruption service positively and without any external arc. It has, also, the desirable feature of repetitive capability.

As a result, the load interrupter has become a widely accepted vehicle for load switching duties in substations, at sectionalizing points on subtransmission circuits, and at critical sectionalizing points on distribution feeders. However, the interrupting unit is recognized as an extra, a plus feature to the conventional disconnect. Consequently, a load interrupter carries a price premium which obviously precludes its use from many of the switching duties on distribution feeders.

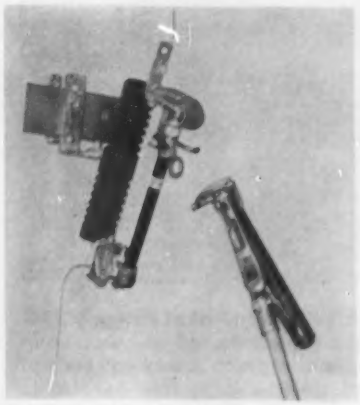
Portability achieved

Safe, positive load switching with repetitive capability having been achieved in economical fashion, with other than an expensive circuit breaker, through incorporating an interrupter unit into a disconnect, it required only the additional feature of portability to make load switching economically

(Continued on page 124)

Step No. 5: With a simple twist of the pole, the Loadbuster is disengaged from the cutout and available for service elsewhere.

Step No. 4: As the opening motion progresses, lower contact of Loadbuster trips, breaking the circuit positively without arcing.



Step No. 1: To use Loadbuster with type XS open cutout, note that it can approach from any angle, any distance, any direction.

Step No. 2: The Loadbuster is now hooked across upper contact of the cutout while operating lever engages the eyelet of cutout.

Step No. 3: The cutout is pulled open in the conventional manner and current is shunted through the Loadbuster itself for the moment.

Sangamo enters the South

◆ SANGAMO Electric Company's first southern plant was formally dedicated last month in Pickens, S.C. Originally planned as a 100,000 square foot manufacturing area and completed in April, the plant was doubled in size with an additional 100,000 square feet just completed.

Principal activity at the plant is the manufacture of electrolytic capacitors in a wide range of sizes for applications varying from radio and television to computers and motor starters. The plant's facilities include every phase of electrolytic capacitor manufacture from the etching of the foil to the finished product.

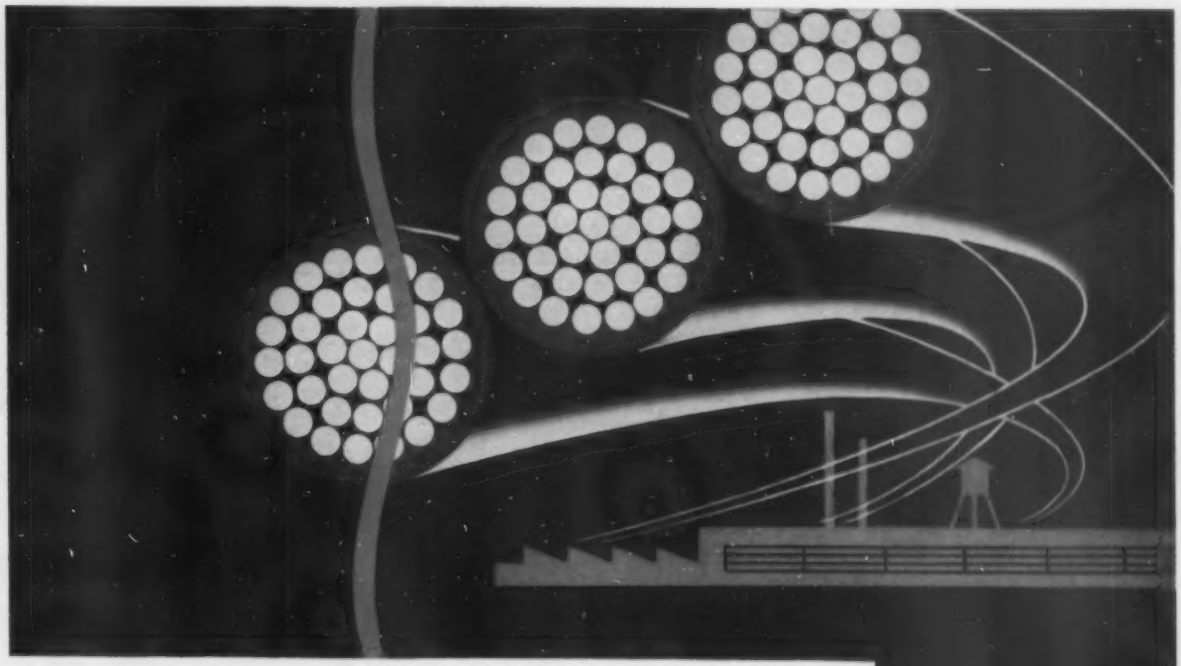
In addition to electrolytic capacitors, the plant will soon be in quantity production of power capacitors for power factor correction purposes on distribution lines, in industrial plants, etc. Some equipment for their manufacture has already been installed and is in operation; additional equipment is to be in operation soon.

The plant also has a section devoted to the manufacture of small generators, converters, and dynamotors, used especially for mobile communication equipment. Another section of the plant includes an electronic apparatus assembly department.

All of the officers and directors of the company were present at the dedication ceremony, including D. S. Funk, chairman of the board, and C. H. Lamphier, president. The ceremony was sponsored by the Pickens County Planning and Development Commission, with Dwight A. Holder, chairman, acting as master of ceremonies. Among the distinguished guests present was South Carolina's governor, Hon. George B. Timmerman, Jr., who made the principal address.

W. G. Dorsett is manager of the Sangamo Pickens Division which will employ approximately 1000 people when full scale operations are established. Although this is the first Sangamo plant in the South, it is Sangamo's fifth manufacturing location.

Sangamo's new 200,000 square foot manufacturing plant at Pickens, S.C., is already in full production on electrolytic capacitors and will soon be in full production on power capacitors. Uppermost photo shows entrance of this hilltop plant. Center photo shows part of the large area devoted to electrolytic capacitors used in computers, radio-TV, and many other applications. Below, one of the winding units for the manufacture of power type capacitors such as are used for power factor correction on distribution lines. In addition, the plant will turn out small generators, converters and dynamotors.



Paranite.. AND THE INVISIBLE INGREDIENT

● Manpower is essential to production... but what is more important is the attitude of the individuals who comprise that manpower. At Paranite, you will find everyone sincerely interested in his part in the manufacture of our wire products.

This conscientious attitude is difficult to see . . . or feel . . . yet it contributes much to the high degree of perfection Paranite products have reached. This, we believe is another important phase of the *invisible ingredient*.

With an entire organization striving to produce each day a better product than the day before, Paranite has earned through the years the respect of contractors and wholesalers everywhere. In fact, these men . . . having long experienced the dependability of Paranite wire products . . . coined a phrase: "If It's Paranite, It's Right!"

So specify Paranite, knowing that the wire and cable you receive is as nearly perfect as human hands can produce . . . utilizing modern equipment and cautious testing. This is the *invisible ingredient* . . . working for you!

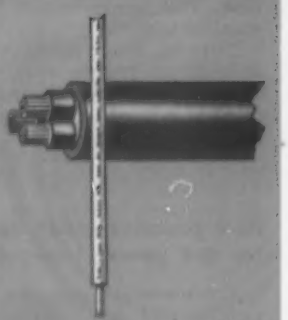
PARANITE WIRE AND CABLE

DIVISION ESSEX WIRE CORPORATION

Factory: Birmingham, Alabama

WAREHOUSES* AND SALES OFFICES

***ALABAMA, BIRMINGHAM, 2901 35th Avenue, North; *GEORGIA, ATLANTA, 241 Boulevard N. E.; NORTH CAROLINA, CHARLOTTE, 823 Professional Building; TENNESSEE, MEMPHIS, 3692 Wayne Avenue; TEXAS, DALLAS, 1919 Levee Street**



From POWER CABLE to FIXTURE WIRE . . . you'll find Paranite quality high . . . service outstanding!

Notes on new utility equipment

Light weight transformer increases core efficiency

A NEW DESIGN of Federal Pacific's 25 kva Gardner distribution transformer has resulted in a reduction of approximately 10% in weight and height, and more than 10% increase in core efficiency, according to Federal Pacific Electric Co., 50 Paris St., Newark, N. J.

Actual savings are: weight reduction, 55 pounds; height reduction,

four inches; and core efficiency increase, 57 watts.

Significant design change is the placing of eight radiator tubes, four on each side, on the outside of the tank. The former model was made without tubes.

This 25 kva, 12,000 volt OISC distribution transformer, designated Type "S", is produced by the Gardner Transformer Division of Federal Pacific Electric Co.

For additional data, ask for item U-1101, using the coupon on page 123.

New pressure relief device for G-E power transformers

A MECHANICAL pressure relief device recently developed by engineers of General Electric Co., Schenectady, N. Y., is being supplied on all of the company's large power transformers that use an automatic gas-seal, gas-oil-seal, or sealed tank type of oil preservation system. The device limits excessive internal tank pressure resulting from any abnormal condition.

Mounted on top of the transformer, the device is ruggedly constructed and protected from the atmosphere by a steel cover. Under normal conditions, a toggle mechanism holds the gasketed cover securely in place. If the internal tank pressure rises about 15 psi, a bellows releases a pivoted latch, allowing the toggle to collapse and the cover to lift, relieving the excess pressure.

For additional data, ask for item U-1102, using the coupon on page 123.

Price and data selector for rural transformers

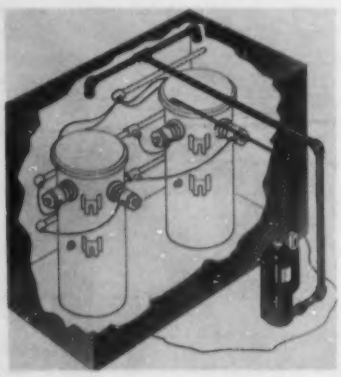
PENNSYLVANIA Transformer Co., Box 330, Cannonsburg, Pa., is offering rural transformer users a convenient, slide rule price and data selector. The pocket-sized selector covers the company's entire line of Pole Star rural transformers, which range in size from 3 through 22 kva, Included are list prices, electrical data and mechanical dimensions for all voltage classes, and for various types of transformers — conventional, conventional with some protective equipment added, and entirely self-protected.

For additional data, ask for item U-1103, using the coupon on page 123.

Automatic dry chemical 30-lb piped fire system

A COMPACT low-cost automatic dry chemical fire extinguishing system for flammable liquid, electrical and textile fire hazards has been developed by Ansul Chemical Co., of Marinette, Wis., manufacturer of dry chemical fire equipment.

The 30-pound piped system (PS-30) can be operated either automati-



cally or manually. It is intended primarily for protection of moderately-sized hazards, such as paint spray and dip operations, small transformer vaults, heat-treating and oil quench operations, ovens, overhead cranes, stationary engines and textile lint hazards.

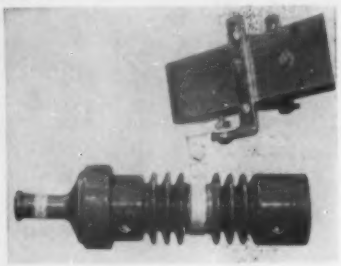
The Ansul PS-30 extinguisher consists of a 30-pound capacity dry chemical unit installed near the hazard and serving as a storage tank for the dry chemical. A special CO_2 gas pressure cartridge furnishes pressure to expel the dry chemical onto the fire through piping connecting the dry chemical unit with the hazard area.

Depending on requirements of the hazard, the system can provide total flooding or local application. Special nozzles are provided to give the most efficient discharge of dry chemical for each type of application.

For additional data, ask for item U-1104, using the coupon on page 123.

Fused cutout redesigned for greater versatility

THE POSITECT, an enclosed fused cutout of the bayonet type for distribution load switching, manufactured by S&C Electric Co., 4434 N. Ravenswood Ave., Chicago 40, Ill.,



has been redesigned to provide greater versatility in application. Line terminals have been changed to the pressure bar type, for use with either copper or aluminum conductors, accommodating a broader range of conductor sizes. To provide reliable service in coastal areas or contaminated atmospheres the leakage distance of the 5 kv, 100 ampere Positect has been increased to match the 7.5 kv Positect.

The auxiliary sleeve liner is now made of a special arc-extinguishing plastic, confining, minimizing, and extinguishing the arc during load switching. Porcelain of the new 100 ampere Positect is glazed in a light brown in order to avoid confusion with the old design which is chocolate brown.

The new Positect is available with interrupting capacities of 10,000 and 12,000 amperes asymmetrical for the 50 and 100 ampere sizes, respectively,

How HAPCO Poles cut maintenance on the New York Thruway...

When the New York Thruway planners specified HAPCO Aluminum alloy lighting standards for the Tappan Zee Bridge, they specified the end of pole painting maintenance. For this most concentrated over-the-water lighting installation in the world posed a major maintenance problem due to its exposure to great amounts of moisture.

Solving the problem with 220 HAPCO tapered Aluminum Poles and 35 special HAPCO Lighting Brackets for mounting on the middle span was a no-maintenance investment. That's because HAPCO Aluminum Poles and Brackets are corrosion resistant. They require no initial or maintenance painting. Maximum structural strength is assured because HAPCO Poles are spun from Aluminum Alloy and Heat-treated. Their silver grey beauty blends with the most modern surroundings, provides the highest visibility for maximum safety.

What's more, HAPCO Standards are designed to fit your individual requirements. Your Hubbard representative will be glad to assist you in specifying the HAPCO Pole that exactly fits your needs. And they're available from more than 300 leading electrical distributors throughout the United States.

Free HAPCO Catalog

If you'd like more details on design features and specifications of the complete Hapco line, write for catalog HAL 754. It contains valuable information to help you plan the most efficient, most beautiful highway and street lighting, as well as any other outdoor lighting requirement. (Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pa.)

HUBBARD ALUMINUM PRODUCTS COMPANY
Division of Hubbard & Company, Pittsburgh 1, Pa.

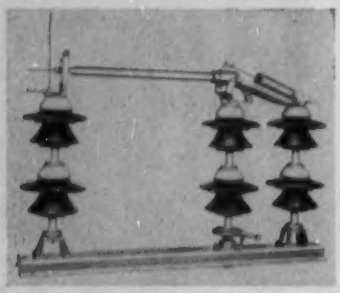
with 14,000 and 16,000 ampere one-shot fuse protection; it is also available for full load switching of load currents to 200 amperes and associated magnetizing and charging currents, without external arc.

For additional data, ask for item U-1105, using the coupon on page 123.

New vertical-break switch for variety of applications

THE A. B. Chance Co., of Centralia, Mo., has announced the release of the Type H1 Switch, a vertical-break, rotating-stack, group-operated, air-break switch conforming to all applicable AIEE and NEMA Standards.

A 3-moving-parts blade-actuating mechanism, permanently lubricated bronze bearings on live parts, and greaseless ball bearing assembly for



the rotating insulator provide smooth, easy operation. A highly conductive current path is provided by braidless, sealed jaw contacts. The switch is ruggedly constructed from materials especially selected for the application.

Available for upright, vertical, or underhung mounting, the H1 is adaptable to most substation requirements; its other applications include line sectionalizing, isolating lightning arresters and circuit breakers, and by-passing. Ratings range from 7.5 to 69 kv; 400, 600, and 1200 amperes.

For additional data, ask for item U-1106, using the coupon on page 123.

Low cost switching for single bank capacitor

A LOW COST method of switching single-bank capacitor equipment is now offered by General Electric's Capacitor Department in Hudson Falls, N. Y.

This new method is made possible with the Type IV vacuum switch, manufactured by Schwager-Wood Corp., Portland, Ore.

Except for a vacuum interrupting chamber, the new switch is similar to the conventional three-pole, group-operated air-break switch. However, it provides switching service only, not fault interruption.

The new vacuum switch is available with all single-bank, grounded capacitor installations between 7.5 and 115 kv, and with ungrounded banks between 7.5 and 69 kv.

The switch is rated 600 amperes continuous current, with a four-second symmetrical rating of 25,000 amps. The momentary current asymmetrical rating is 40,000 amps. The recommended maintenance period is after 2,500 operations.

With lower cost high voltage capacitor switching now available, General Electric engineers believe many proposed capacitor applications once rejected as uneconomical by utility companies may now be reconsidered and found feasible.

For additional data, ask for item U-1107, using the coupon on page 123.

Squeeze bottle simplifies applying joint compound

TO MAKE it easier for linemen to apply joint compound in connecting aluminum or ACSR, Burndy Engineering Co., Norwalk, Conn., is offering Penetrox in 8-oz. polyethylene squeeze bottles. The oxide-penetrating corrosion-inhibiting compound is also available in collapsible tubes and in pint, quart, and gallon cans.

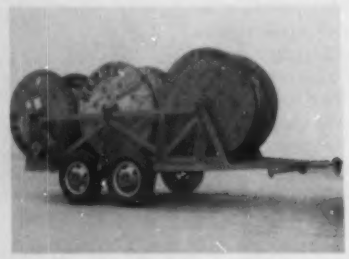
The new Penetrox squeeze bottle has a nozzle that can be trimmed to vary the orifice for a particular job, and a self-threaded cap to reclose the orifice after use. The cover unscrews, leaving a 1¼" diameter opening thru which the bottle can be filled.

The polyethylene container is unaffected by temperature, grease, oil, acids, or other chemicals. Bottles are colored standard Burndy green and orange, permanently labeled with information on conductor types, voltages, and directions for applying Penetrox.

For additional data, ask for item U-1108, using the coupon on page 123.

Trailer eases handling of heavy cable reels

EASY-TOWING, one-man loading trailers designed for transporting and dispensing large reels of electric cable are being offered by Utility Equipment, Inc., of 13 Eureka Street, Buffalo, N. Y. These trailers are con-



structed of heavy steel and are welded throughout. They are equipped with a standard clevis trailer hitch and are suitable for use behind Jeeps or trucks of one-and-one-half tons and up. Mounted on steel wheels, pneumatic tires, and equipped with tapered roller bearings, they are designed for good balance, and roll easily on the road.

A feature of the trailers is the one-man loading gear which consists of specially designed arms which pick up the reels, and, with the aid of a powerful winch, places them on rail racks on the trailer. Reels are held securely in position on the racks, and can be revolved for dispensing cable as required on the job.

Telephone companies, electric utilities, electrical supply houses and contractors can use these flexible units, and in many instances, replace trucks at much lower operating costs.

For additional data, ask for item U-1109, using the coupon on page 123.

New type PH 600-ampere horizontal break switch

A NEW 600-ampere, horizontal (side) break, switch augments the line of outdoor, group-operated disconnect-switches manufactured by Line Material Co., 700 W. Michigan St., Milwaukee, Wis. The new type PH switch, designed for horizontal, vertical, or inverted mounting, is rated at voltages of 7.5 through 69

kv. It offers dependable service for sectionalizing, disconnecting, and by-passing applications and meets all the latest NEMA specifications.

The new PH unit incorporates a swivel type, full-floating contact assembly on the stationary insulator that assures low operating effort and positive ice breaking action. Construction of contact assembly compensates for switch blade misalignment and allows closing of switch regardless of contact position.

Like the present line of PV switches, the new PH switch features silicone grease lubrication to inhibit corrosion on all rotating points, which are permanently sealed by silicone cord rings; only six current interchange points; and adjustable terminal clamps. Other features include high pressure, silver-to-silver contacts and a flexible interphase mechanism and lever assembly.

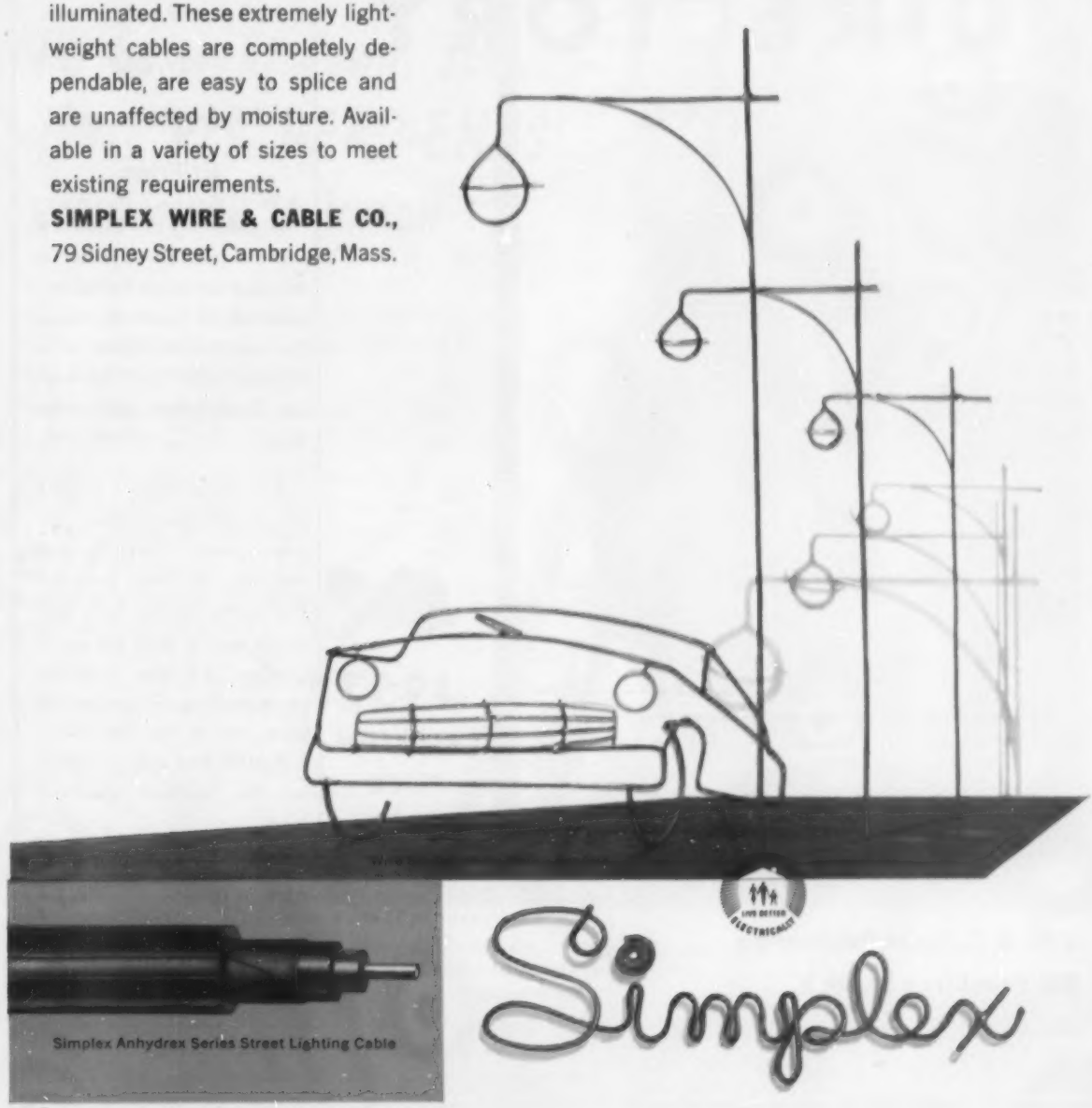
For additional data, ask for item U-1110, using the coupon on page 123.

Not so long ago, people rarely drove their automobiles at night, because poor street lighting constituted a considerable safety hazard. Nowadays, streets are brilliantly lighted and night driving is taken for granted.

Simplex ANHYDREX Series Street Lighting Cables play an important part in keeping the nation's thoroughfares brightly and safely illuminated. These extremely lightweight cables are completely dependable, are easy to splice and are unaffected by moisture. Available in a variety of sizes to meet existing requirements.

SIMPLEX WIRE & CABLE CO.,
79 Sidney Street, Cambridge, Mass.

SAFETY FACTOR NO. 1



Simplex Anhydrex Series Street Lighting Cable

Simplex

NEW... the 1957 edition Coming in December, 1956

the ELECTRICAL SOUTH

DIRECTORY

of

ELECTRICAL MANUFACTURERS and their SOUTHERN and SOUTHWESTERN REPRESENTATIVES

1957 EDITION

PRICE $2.50

Providing Essential Buying Information for Southern Wholesalers, Electrical Contractors and Utilities.

In compiling this Directory, we have endeavored to furnish the most complete listing possible of all electrical manufacturers in alphabetical order together with their Southern and Southwestern representatives.

For convenience, a number of manufacturers have included cross - reference advertising on their products. This extra service will help locate special facts and specifications and other pertinent product data. So far as we know, this is the first Directory of its kind ever published for the Southern electrical trade.

a W. R. C. Smith Publication
806 Peachtree St., N. E.
Atlanta 8, Georgia

Please send me the 1957 ELECTRICAL SOUTH Directory as soon as it is off press. My check for $2.50 is enclosed.

Name _____

Company _____

Street & Number _____

City & Zone _____

State _____

State _____

"I'll be right down, Joe... These PLP DEAD-ENDS are a cinch to install"...

Installation of a PLP Dead-End is no trick at all. It's fast and it's done right the first time, by hand. No need to recheck later.

The resulting installation is neat . . . safe . . . permanent.

The streamlined appearance speaks for itself. Safety is assured because there are no sharp edges, no concentrated stress or fatigue point.

A speedy installation, and trouble-free service are reasons why linemen prefer PLP Service Entrance Dead-Ends. Call a PLP Representative today, ask for a demonstration.

PX-76

Made in accordance with or for use under U S. Patent No. 2,761,273; other patents pending

PLP

PREFORMED LINE PRODUCTS COMPANY

5349 St Clair Avenue — Cleveland 3, Ohio

TELEPHONE: CLEVELAND EXPRESS 1-3571

News of the industry

edited for Southern readers

Georgia Power plans to purchase Georgia P&L

PLANS for the purchase of the properties of Georgia Power and Light Company by the Georgia Power Company have been announced. In a joint statement by Harllee Branch, Jr., president of Georgia Power Company, and John W. Lastinger, president of Georgia Power and Light Company, it was stated that the properties would be acquired from the Florida Power Corporation of St. Petersburg, Fla.

The proposed acquisition is subject to the approval of the Georgia Public Service Commission and other regulatory agencies and final agreement on a formal contract. It is also conditioned on the granting to the Georgia Power Company of satisfactory franchises by municipalities in the South Georgia area.

It is estimated that the purchase price will be $16,500,000, including the assumption by the Georgia Power Company of the Georgia Power and Light Company's bonded indebtedness of about $6,500,000.

Mr. Branch said he hoped the transaction could be completed early in 1957 and the Georgia Power and Light operation, which serves 19 counties in South Georgia, would become the Valdosta division of the Georgia Power Company at that time.

He pointed out that there would be no changes in the electric rate schedules in the Georgia Power and Light Company territory at the present time, pending the development of a new power source in the area to be completed in 1960 or 1961.

Subsequently, the rate schedules are expected to be made uniform with those of the Georgia Power Company. Based on present rate levels, this would mean a reduction to all classes of customers in the South Georgia area.

Mr. Branch pointed out that the rates as well as other details of the consolidation are subject to Public Service Commission approval. He stated that all present employes of the Georgia Power and Light Company will be invited to remain with the Georgia Power Company after the transfer of the property is effected.

"The directors of the Georgia Power and Light Company," Mr. Lastinger said, "realized that it was in the best interests of the customers in South Georgia that the property be operated by the Georgia Power Company which now serves nearly 600,000 customers in 137 counties of Georgia. All of us will be extremely proud to become members of the Georgia Power Company organization and each of us promises to live up to the well-known slogan of the company, 'A Citizen Wherever We Serve'."

Officers of the Georgia Power and Light Company, in addition to Mr. Lastinger, are: C. W. Warner, vice president; E. C. Rees, vice president and assistant treasurer; A. H. Burning, vice president; and E. J. Willis, treasurer.

Chatttanooga CLP gains momentum

"A LIGHTING job certified to conform to nationally established standards mean more profit, more satisfied customers, and more prestige to the electrical contractor and the customer," stated National Lighting Bureau Manager Laurance C. Messick at a recent Chattanooga Electric League meeting. Five electrical contractors confirmed this theory as they presented certificates of Certified Lighting to ten satisfied customers who were guests of honor at the meeting.

Another group of honored guests were the graduates of the recent seven session "Certified Lighting School," sponsored by the Electric League. Twenty-two per-

Laurance C. Messick, manager of the National Lighting Bureau, addresses a recent meeting of the Electric League of Chattanooga. (Right) These five contractors are the first to have installed Certified Lighting in Chattanooga. They are (seated) Lloyd Ragan, R. N. Stilwell; (standing) C. W. Whitaker, R. M. McKenzie, and K. C. McClure. Certified Lighting customers were honor guests at the meeting.

This new Systems Operations Center of the Jersey Central Power & Light Company keeps in touch with remote stations through Bell System channels for telemetering and remote control.

Bell System communications help Jersey Central regulate power transmission

Colored pegs in wall diagram indicate segments of line to be isolated for maintenance work.

Channels for telemetering and remote control enable the Jersey Central Power & Light Company to regulate power transmission every step of the way from generator to home, store and factory.

An engineer glances at the dials, which give him a running picture of the system and the changing demands he has to meet—information which has been brought to him by Bell System telemetering channels.

From his position, he switches loads, starts and stops generators and localizes failures—even at distant points—over a network of remote control channels provided and maintained by the Bell System.

If you would like to know more about how Bell System communications can help you, an engineer will be glad to survey your company's needs. There's no obligation. Why not call your Bell Telephone representative today?

BELL TELEPHONE SYSTEM

Private Line Telephone, Private Line Teletypewriter
Channels for: Data Transmission, Telemetering, Remote Control, Telephotograph, Closed Circuit TV

sons completed this course and received graduation degrees.

The League's Certified Lighting Program is rapidly gaining momentum. At the present time over half a dozen lighting jobs have been approved to receive Certified Lighting certificates upon completion of the lighting installation.

Members of the League's Lighting program Executive Committee that organized this project are to be commended for their fine promotion job. They are: Bill Redd, General Electric Co.; Craig Schmidt, Sweet Electric Co.; Buford Martin, TVA; and Bert Osborne, Paul McMillan, Hassell Qualls and Roger Dodson, all of the Electric Power Board of Chattanooga. Mack Gilbert of the Power Board is the certifying authority.

Mr. Messick expressed his gratification for Chattanooga's acceptance of Certified Lighting. A vast amount of publicity and promotion will be behind this program the coming year—on a national and local basis.

Southern sales agents appointed by Richards

R. MARION PICKARD, Inc., with offices at 215 W. Bland St., P. O. Box 2523, Charlotte, N. C., have been appointed sales agents to represent the J. R. Richards Company in the states of North and South Carolina. R. Marion Pickard, Inc., have been established as manufacturer's representatives for the past eight years and are headed by R. Marion Pickard.

The J. R. Richards Company are manufacturers of switch and outlet boxes and covers, conduit fittings, and other electrical specialties.

Radiant heat for area topic at Georgia meet

THE RAPIDLY growing interest in electric radiant heating was evidenced by the attendance of 39 individuals at a dinner meeting in Macon, Ga., recently, sponsored by Ceil-Heat, Inc., and Lowe Electric Co., the Ceil-Heat distributor of Macon, Ga. Communities as much as 80 miles distant were represented by contractors interested in this type of heating which is relatively new in Georgia but long established in many other areas.

Sales manager of Ceil-Heat, L. O. (Sheriff) Ledford, made the principal talk and was assisted by Jim Rittenhouse, of Georgia Power Co., who pointed out that commercial rates in Georgia are very favorable by comparison with those in other areas.

The comfort, convenience, and low cost of electric radiant heating was thoroughly covered and many examples were pointed out. The fact that Georgia climate is very favorable and the utility companies are eager to extend every help possible and full co-operation assures the rapid growth of this new phase of the electric industry in this area.

Thousands are now enjoying this type of heating system which is absolutely silent, requires no service in a lifetime, takes no space in the room, leaves no odor, needs no attention for operation, and gives the maximum of well distributed heat, comfort, and safety, it was pointed out.

The many inquiries which are constantly coming in to Ceil-Heat and their distributors are good evidence of this increasing interest.

Group of contractors who attended a recent dinner meeting in Macon, Ga., sponsored by Ceil-Heat, Inc., and Lowe Electric Co., Macon electrical distributor. They discussed possibilities of electric radiant heating for the area.

Names selected for Alabama power plants

CHAIRMAN of the board of Alabama Power Company, T. W. Martin, has announced that the board of directors of the company, at its meeting held at Mobile recently, decided to name the dam to be built at the New Hope Site on the Sipsey Branch of the Warrior River for Lewis M. Smith, who is a director and president of the company. It was also decided to name the dam and power plant to be built in Cherokee County, this being the first of the new Coosa River dams, for Fernand C. Weiss, who is a director and vice-president and chief engineer of the company.

Mr. Smith, native of Jefferson County and a graduate of the University of Alabama, began work with the company in 1923 as a draftsman, and became chief electrical engineer in 1939. For the past fifteen years he has occupied various executive positions, becoming president on the resignation of James M. Barry in 1952.

Mr. Weiss, native of Texas, is a graduate of Massachusetts Institute of Technology. He joined the engineering group of the company in 1913 and became chief engineer on the retirement of chief engineer Oscar G. Thurlow some years ago. Mr. Weiss is unmarried and resides in Birmingham.

Traweek-Healy named Texas-Oklahoma agents

TRAWEEK-HEALY & Associates, with headquarters at 5523 Dyer Street, Dallas, Texas, have recently been appointed district representatives for the entire states of Texas and Oklahoma for the Electro Silv-A-King Corp., Chicago, Ill., and Reading, Pa.

The Traweek-Healy partnership was established in February of 1954 by Herb Traweek and John L. Healy. Mr. Traweek, a native Texan, has spent thirty years in electrical contracting, distribution, and sales of electrical products. Mr. Healy, originally from Florida, has had ten years of practical experience in contracting and sales operations.

Ernest L. Dungey is in charge of the Houston, Texas, branch at 1111 Rosalie Street. Mr. Dungey, a highly skilled sales engineer, serves the Houston, Beaumont, and Rio Grande Valley area. He was previously with the Southern California Edison Company as a district commercial lighting con-

New

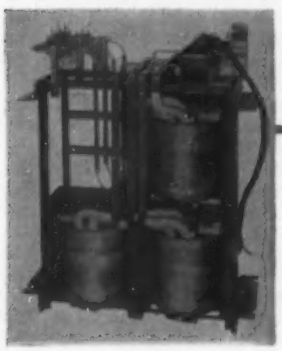
ALLIS-CHALMERS Vault-Type Power Unit

. . . the modern solution to industrial and commercial load concentration problems

Does the job of three or four distribution transformers

● With sprawling shopping centers and other commercial and industrial construction mushrooming everywhere, the problem of energy distribution is becoming more and more acute. The low-cost, labor-saving, space-saving solution lies in the utilization of Allis-Chalmers vault-type power units.

In a vault or on ground level slab, this Allis-Chalmers unit requires only *half the space* of a bank of distribution transformers. The compactly designed tank contains three or four standard single-phase distribution transformer core and coil assemblies. Three-phase or single *and* three-phase service is provided. Metering transformers can also be included in the tank.



Labor costs are trimmed appreciably. Units are internally connected at the factory, thus power connections at the site are greatly simplified. Complicated primary and secondary bus work is eliminated.

Save on Vault Costs
Reduce Space Requirements

Present vault capacities can be doubled with no additional construction expense. With a slab installation, this unit takes up only half the space of the three or four distribution transformers required to do the job.

On units rated 300 kva and below, space is provided for the addition of a single-phase core and coil assembly to provide both three-phase and single-phase service if desired.

Get the complete story from your A-C representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin 61B8208.

ALLIS-CHALMERS

A-5236

Herb Traweek | John L. Healy | Ernest L. Dungey | Warren McFarlane

sultant, and street-lighting consultant.

Warren McFarlane is in charge of the Oklahoma City, Oklahoma, branch at 3812 Northwest 25th Street. Mr. McFarlane has had 11 years sales experience in the electrical field, and has a wide industry acquaintance in the area he covers—the state of Oklahoma, and Amarillo, Lubbock, and Wichita Falls, Texas.

Magazine features need for adequate wiring

TO HELP alert homeowners to the crucial need for adequate wiring in their homes, LOOK Magazine published in its October 16th issue, a major article on "America's Great Wiring Mixup."

The article, which runs to two-and-a-half pages (two of them in full color), gets across the need for adequate wiring by means of humorous drawings and appropriate captions.

Designed to help householders recognize the signs of inadequate wiring, the drawings vividly depict the most common symptoms of an overloaded circuit. Most of these symptoms, as shown in the LOOK article, reflect unsatisfactory operation of various appliances, such as fluctuating TV pictures, overheated air-conditioner motors, slow-heating electric irons, fading radio volume and failure of freezing compartments to keep foods frozen.

The homeowner is told that if these and other problems of inadequate wiring plague his home, he can have his house rewired at a cost that may come to as little as the price of a refrigerator, and that time payments are often available.

As a further service to LOOK readers, the article also includes a wattage chart by which homeowners can gauge their wiring needs. The chart, prepared with the aid of the National Electrical Contractors Association and the National Adequate Wiring Bureau, designates the number and type of appliances that can be used in homes wired for 30-, 60 and 100-ampere service, with a range of 3,600 to 24,000 watts in basic capacity.

In a note accompanying the chart, LOOK urges readers: "For an exact analysis of your needs, call your local utility or appliance store or consult a qualified electrical contractor."

LOOK is making reprints of the full-color pages available to appliance dealers, distributors, contractors and utilities for consumer distribution. Organizations cooperating in the program by pointing out to their members that the reprints may be used at the consumer level to combat problems of inadequate wiring include the Edison Electric Institute; the National Association of Electrical Distributors; the National Electrical Contractors Association; the National Adequate Wiring Bureau, and the Electric Companies Advertising Program.

Lighting Education Award offered for second year

FOR THE SECOND year, an award covering lighting activities of an educational nature conducted by operating electric light and power companies will be offered by the Better Light Better Sight Bureau, it was announced by H. A. Stroud, promotion manager, Monongahela Power Co., and Chairman of the Bureau.

The award, known as the Lighting Education Award, was given for the first time at the 1956 EEI Sales Conference, covering activities of 1955.

Purpose of the award is to recognize noteworthy educational activities which foster a better public understanding of the relationship of light and sight.

Two bronze plaques are awarded, one to companies with 250,000 or more total meters, and one to companies with less than 250,000 total meters. Plaques covering 1955 activities were awarded to the Cleveland Electric Illuminating Company and the Dayton Power and Light Co.

The Lighting Education Awards are an outgrowth of the Planned Lighting Awards, which were discontinued last year. A parallel award, covering sales promotional activities, is the Lighting Promotion Award, sponsored by three of the major lamp bulb manufacturers.

Bureau announces program for commercial wiring

A COMMERCIAL and institutional adequate wiring program, based on the facts learned through a recently completed market survey, is now being prepared by the National Adequate Wiring Bureau and will be launched in 1957. It will seek to enlist the support of all branches of the electrical industry and will furnish promotional materials necessary to help electrical utilities and contractors sell better wiring installations in business establishments and public buildings.

Judging from the expression of interest all over the country, cooperation from the various industry groups will be readily forthcoming.

The need for a coordinated plan of this nature has been indicated for some time. That is why, in June, 1955, in anticipation of the added emphasis which residential wiring is now receiving, the sponsors of the National Adequate Wiring Bureau enlarged the Bureau's scope to include the promotion of adequate wiring in commercial and institutional occupancies. For 1956, the Bureau received an allo-

cation of funds to explore the possibilities of a program in this market.

New approach needed

In studying the problem, it was recognized that, while both utilities and contractors consider this field as a single market, it is not susceptible to a common approach, as is the residential market, except in the most generalized terms. There is little in common between such diversified structures as apartment houses, office buildings, gasoline service stations, super markets and restaurants, except that the owner is in business for profit. Even this is not true of schools, churches or hospitals. Certainly the electrical uses, and therefore the wiring needs, are extremely varied.

It being obviously impossible to attempt a full-scale promotion in so many varied fields simultaneously, ways were sought to make a selection based upon such factors as: (1) extent of potential business for utilities, contractors, manufacturers and wholesalers, (2) present degree of inadequacy, (3) need of assistance in selling and (4) principal obstacles in successful selling.

Under the supervision of a special task group within the Bureau's Plan Committee, two questionnaires were prepared. After testing in a pilot study, one was sent to utilities, since they have a major interest in promotion, and the other was sent to contractors, because their main responsibility is selling and installing electrical wiring.

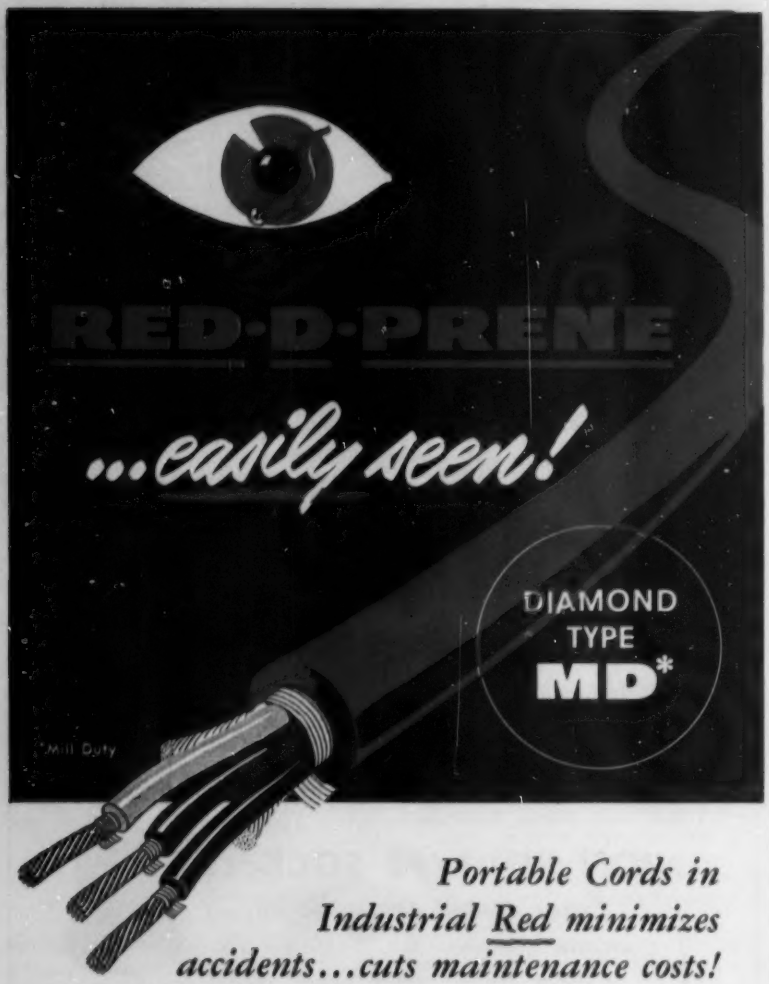
A logical, if somewhat arbitrary, classification of commercial and institutional occupancies was listed from which the respondents could select their choice in answer to most of the questions.

Survey findings

Tabulation of the answers revealed that apartment houses are the commercial occupancy most handicapped in the use of electricity because of poor wiring—the occupancy requiring the most service calls, and the one requiring most promotional help to sell customers on the need for wiring.

Typical retail establishments were termed the easiest type of occupancy to improve in bringing wiring up to date—the occupancy believed to offer the greatest potential increase in kilowatt hours, and the overwhelming choice for the electrical industry to concentrate on. (Typical retail establishments, as used in the questionnaire, is a miscellaneous conglomeration embracing supermarkets and all small stores selling one or more types of closely related products.)

Office buildings were regarded



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SYCAMORE, ILLINOIS

not only as the occupancy affording greatest ease in making sales, but also the one providing the best opportunity to expand wiring sales.

Respondents advocated direct mail as the form of sales promotion most suitable for the Bureau to employ, both on a national and a local basis, in undertaking a commercial and institutional adequate wiring program. Moreover, they suggested that initial promotion should emphasize wiring in existing structures rather than in new structures.

The utilities indicated keen interest in a commercial wiring program. This was evidenced by a response to the questionnaire of better than 50 per cent from all over the United States.

Midwest wholesalers meet in Missouri

THE 1956 meeting of the Missouri River Club was held October 4th through 6th at The Elms Hotel, Excelsior Springs, Mo., 30 miles northeast of Kansas City. The Missouri River Club is made up of a group of electrical distributors from a six-state midwestern area.

The Missouri River Club meeting provides distributors and manufacturers with an opportunity for an exchange of ideas and discussions which would be of benefit to both. A three-day session of this distributor group was held in 1955. It was the first such meeting since 1931 when the organization had disbanded after about 10 years of existence.

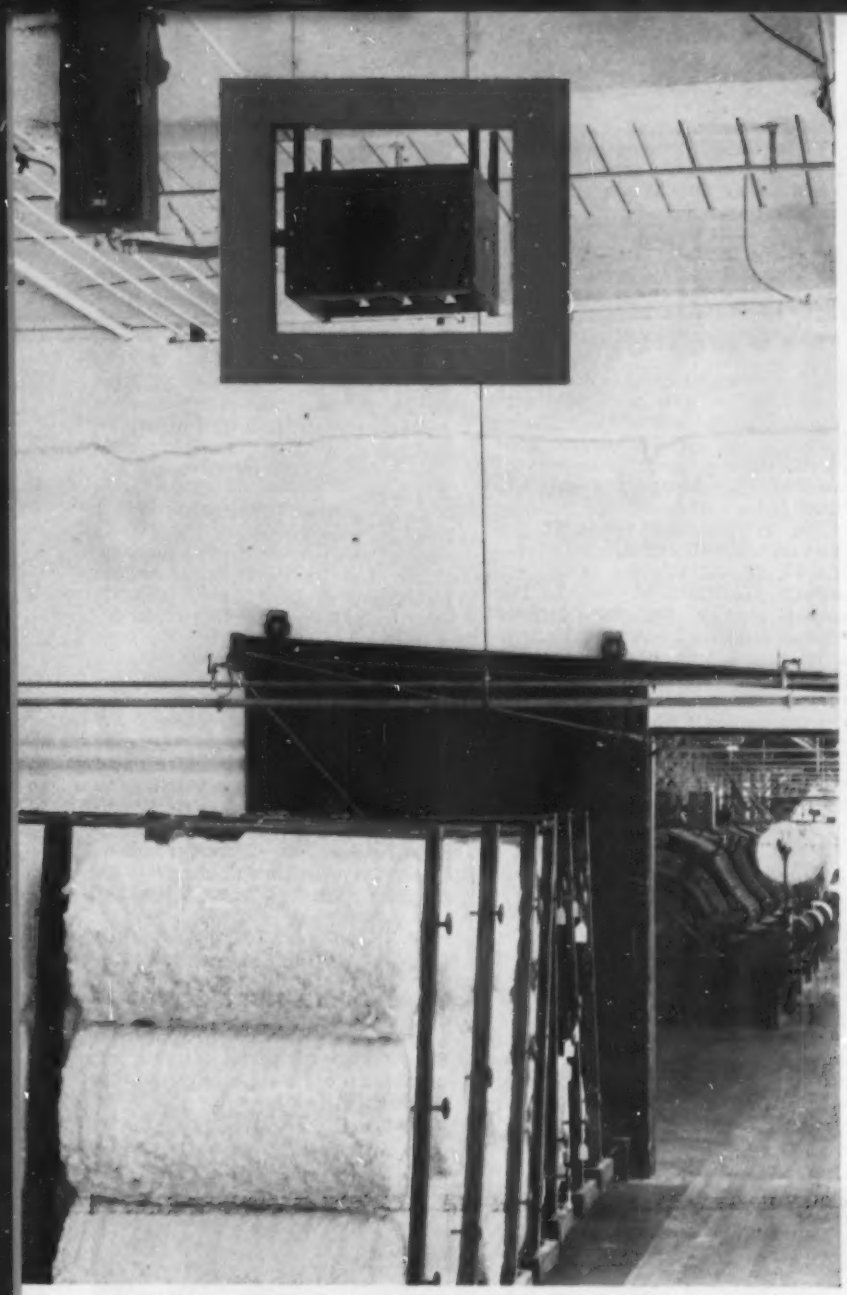
Among this year's speakers was Arthur W. Hooper, Executive Director of the National Association of Electrical Distributors.

Industrial Trade Show planned for Kansas City

DON D. DAVIS, president of the Electric Association of Kansas City, has announced plans for an Association - sponsored Industrial Trade Show for April 16, 17 and 18, 1957, in Exhibition Hall, Municipal Auditorium, Kansas City, Mo.

The show will be patterned after highly successful Electric Association shows of recent years and will be limited to exhibitors of Supply, Apparatus, and Lighting from member firms of the Electric Association. No appliances will be exhibited.

Exhibitor space will be in standard 10′ by 10′ booths. Features of the show will be an enclosed theatre for lectures and demonstrations, and a large and comfortable



How Pepperell saves $15,000 a year with capacitors

"Reduced line losses, increased system capacity, improved voltage conditions and an estimated $15,000 a year savings in our electric power costs are the benefits we've gotten from installing General Electric industrial capacitors," says Mr. Comer Turley, Mechanical Superintendent at the Pepperell Manufacturing Company of Lindale, Georgia.

Like most manufacturing plants, Pepperell, maker of denim goods, has a power factor clause in its electric utility contract. This means that the higher its power factor, the lower its power costs. Since the firm started with a power factor of 74% and is now running at approximately 98% power factor, dollar savings, from power-cost cuts alone, amounted to $4481 for the first four months of this year.

Total estimated savings for a year will be easily $15,000. This means that Pepperell will pay off its capacitor investment with dollars saved from its power costs in about two years—and then continue its savings as sheer profit for some years to come. **Can you afford to overlook savings like this in your plant?** If you use induction motors, check your power factor—or ask your G-E sales engineer to do it for you. Then check your utility power contract and see how much you will save by raising your power factor. You and your sales engineer will be able to determine *in advance* how much you will receive in dividends on your investment in General Electric capacitors. For more information, write for Bulletin GEA-5632, "How To Use Capacitors." General Electric Co., Section 441-113, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

lounge area for exhibitors and guests.

The Kansas City show will immediately follow the St. Louis Show, sponsored by the St. Louis Electrical Board of Trade and will be one week ahead of the Omaha show, sponsored by the Nebraska-Iowa Electrical Council.

Mr. Davis pointed out that the coordination of these three shows will provide an opportunity for exhibitors to participate in all three with a minimum of shipping and handling cost.

Complete show details can be obtained by writing the Electric Association, 22nd and Grand Ave., Kansas City, Mo.

Utility aids city in relighting program

GENUINE INTEREST in public service on the part of the privately owned local power company in Franklin, Tenn., has paid off in two ways. Franklin Power & Light recently bought and installed 34 new 20,000-lumen mercury vapor street lights, replacing 25 outdated incandescents on the downtown streets. Over 5000 citizens from the Franklin area, out of 25,000 population, turned out for the relighting ceremonies. So Franklin has modern downtown street lighting, and Franklin Power & Light has even more goodwill from its customers.

Line Material Ovalite luminaires were used for the new lights. They are mounted on eight-foot bracket arms atop 30-foot steel standards spaced 100 feet apart in a staggered arrangement, and power is supplied by a series circuit through an L-M uni-ballast installation. The city of Franklin is repaying the $7,500 cost of materials on a percentage basis determined by the initial investment.

Slow home fan sales result in overstock

A TOTAL inventory of more than $1 million in household fans was reported by 122 electrical wholesalers in a special survey conducted among some members of the National Association of Electrical Distributors.

The total dollar value of the units on hand—as of August 31st—was $1,198,783. (Dollar value represents distributor's cost.) The special survey did not include kitchen fans, bathroom fans or exhaust fans. It was conducted by the NAED Fan and Ventilating Committee. Chairman C. O. Stoike, of Revere Electric Supply Co., Chicago, Ill., attributed the great amount of overstock—for comparatively few distributors—to a slow fan selling season, probably brought about by this summer's generally cool weather.

While neither the National Association of Electrical Distributors, nor the Fan and Ventilating Committee, have made definite recommendations with regard to this situation, many individual distributors—who are most seriously effected by overstock in their inventories — have indicated that same type of protection on their investment is needed, particularly in view of the constant introduction of new fan models each season.

AIEE Memphis conference views farm electrification

THE AMERICAN Institute of Electrical Engineers (AIEE) Conference on Farm Electrification was held in Memphis Oct. 29-31 at the Hotel Peabody.

The conference was attended by leading figures in the rural electrification field and dealt with a wide range of problems from the viewpoints of both the farmer-consumer and the rural electric power supplier. In addition, manufacturers of electrical equipment found much of interest in the meetings.

One of the highlights of the meeting was an inspection trip of several modern electrified poultry, dairy, and livestock farms where electricity is used extensively to save time, labor, and to reduce operating costs.

Program chairman was J. H. Oliver of the General Electric Co., Schenectady, N. Y. The welcoming address was presented by George Davis of the Arkansas Power and Light Co., chairman of the Memphis Section of AIEE. The conference was closed with a summation of the highlights of the meeting by Jim Ridout of New York City, editorial director of electricity on the Farm Magazine.

Facilities doubled at Alabama plant

ANDERSON Electric Corporation has announced plans for further expansion of aluminum products facilities at Leeds, Ala.

According to R. E. Schuler, presi-

"Before" night view of Franklin, Tenn., town square and county courthouse before Franklin Power & Light helped the city in its relighting program. Old lights were incandescents mounted on 15-foot upright concrete poles. At right, "After" night view of town square with 34 new 20,000-lumen mercury vapor street lights mounted on 8-foot bracket arms atop 30-foot steel standards 100 ft. apart in staggered arrangement. Line Material Ovalite luminaires were used for the relighting.

dent, actual work got under way early in October. He said, "We are simply going into the second stage of our planned expansion program at the Leeds plant. By January 1, 1957 all of our aluminum products division will be concentrated at Leeds. Our facilities there, including buildings, foundry and manufacturing equipment will be the most modern and efficient in the industry.

"Our entire operation at the Leeds plant will be completely self-sufficient . . . . . from pattern shop to final inspection and shipping. The new expansion will make a total of more than 32,000 square feet of manufacturing space added since January 1, 1956. All the buildings at Leeds are a combination of masonry, rigid steel frame and galvanized steel panel construction . . . . very modern types of structure especially suitable for our type of manufacture."

Peabody Bros. named Southwest sales agent

PEABODY BROTHERS, Dallas, Texas, has been appointed sales representative for Murray Manufacturing Corp., Brooklyn, N. Y., makers of safety switches, fusible service equipment, circuit breakers and metering equipment.

Long established in the Southwest, Peabody Brothers will handle the complete Murray line in both Texas and Oklahoma. Main sales office and warehouse is in Dallas, with branch facilities in both Houston and Tulsa.

PUAV elects officers and hears industry men

WILLIAM J. STEWART, assistant general manager of the Wheeling Electric Company, Wheeling, W. Va., was elected president of the Public Utilities Association of the Virginias at the 38th Annual Meeting of the Association at White Sulphur Springs, W. Va., recently. He succeeds Don B. Potter, president of Monongahela Power Company, Fairmont, W. Va.

Other newly-elected PUAV officers are John C. Parrott, president of the Roanoke Gas Co., Roanoke, Va., who succeeds Mr. Stewart as first vice-president, and Hugh D. Stillman, division manager, Appalachian Electric Power Co., Huntington, W. Va., who was elected second vice-president. W. F. Keehne, system office manager, Appalachian Electric Power Co., Roanoke, Va., was re-elected as treasurer and Arthur T. Ellett, secretary-treasurer, Roanoke Gas Co., Roanoke, Va., was

for Better and Easier-
STORE FRONT LIGHTING INSTALLATIONS

Revere ELECTRIC MFG. CO. CHICAGO, ILL. WALL and ROOF BRACKETS

(PATENTS PENDING)

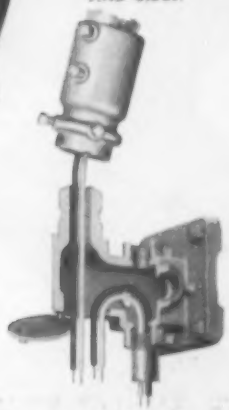
EASIEST TO WIRE AND INSTALL

ARM AND LUMINAIRE WIRED IN ADVANCE. FITTER SLIPS OVER POST AND YOUR HANDS ARE FREE.

AMPLE ROOM BELOW TRANSFORMER. BIG SPLICE BOX HAS 4 TAPPED HOLES.

NOTE HOW WIRES FROM ASSEMBLED ARM AND LUMINAIRE RUN STRAIGHT THROUGH. "X" TYPE SPLICE BOX PERMITS CONNECTIONS FROM TOP, BOTTOM AND SIDES.

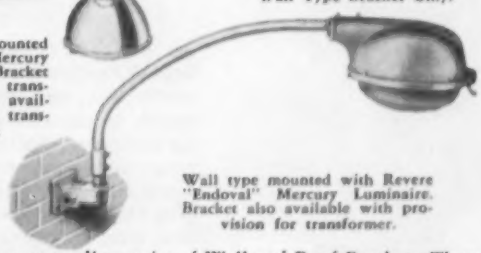
Cat. No. 861
Wall Type Bracket Only



Cat. No. 860
Wall Type Bracket Only.

NOTE LARGE, CURVED RACEWAY WHICH PERMITS EASY FISHING.

Roof type mounted with Revere Mercury Luminaire. Bracket shown with transformer. Also available without transformer.



Wall type mounted with Revere "Endoval" Mercury Luminaire. Bracket also available with provision for transformer.

Revere scores again with this outstanding series of Wall and Roof Brackets. They are Superior in Design — Quality and Performance . . . of Heavy-Duty Cast Aluminum Construction and save hours in Installation time through simplified provision for wiring. Available with 1¼ inch aluminum arms or with hot-dip galvanized steel arms for mounting Revere Mercury or Incandescent Luminaires. Arms are locked in position with heavy cup-point screws. Roof type arm swings over parapet. Wall type swings back to wall for safe, easy servicing.

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Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

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AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

elected as assistant treasurer. Robert W. McKinnon, of Roanoke, Va., was re-elected executive secretary.

During the conference, over 425 delegates heard Philip Sporn, president of the American Gas and Electric Co., describe the growth of the electric utility industry as "perhaps the most dramatic in America's thriving enconomy." Following a glowing forecast on the outlook for the public utility companies of the nation for the next two decades, Mr. Sporn warned that realization of present estimates will require the fullest use of the utilities' technical, financial and manpower resources.

Edwin Vennard, vice-president and managing director of Edison Electric Institute, told the conference that the electric utilities' principal problem is preventing further encroachment by socialized power. He pointed to significant favorable changes in public attitudes toward the privately owned utility companies in recent years and said that wherever the public was aware of the facts of public power they favor private company operation of utilities. He presented as a solution to the public power threat a program of constant education by each company, starting with the company's own employees and being extended to the general public later.

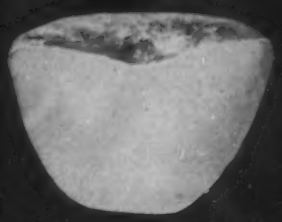
Dr. John A. Hutcheson, vice-president - engineering, Westinghouse Electric Corp., Pittsburgh, Pa., said that the future growth of the electrical industry will depend on knowledge obtained through basic research. He said that the inventor of 50 years ago has become the development engineer today. He noted that development engineers must have more knowledge of the characteristics of their raw materials. He said that, for example, the direct conversion of nuclear or fusion energy to electrical energy without going through the thermal cycle may be possible, but the basic information required to develop such a process is not yet at hand.

Stuart T. Saunders, vice-president and general counsel of the Norfolk and Western Railway Company, discussed the mutual interests of the railroads and the other public utility companies in developing the economic resources of the Virginias. He described recent important developments in the bituminous coal industry and forecast that the mines of the region will be called upon to supply a large part of the fuel requirements of Europe as well as the United States within the foreseeable future.

Annual meeting delegates also heard reports on projects and ac-

wonder where the BUBBLES went?

Visible voids spot the test pour of an improperly-fluxed heat of aluminum.



A typical cross-section of sound, bubble-free Anderson Aluminum test pour.

QUALITY CONTROL from the very start removes any chance of "gas porosity" weakness from

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SUBSTATION CONNECTORS

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ANDERSON PREDETERMINES LONGER LIFE . . . greater efficiency . . . and higher tensile strength by putting to work the *probing, fact-producing* experiences of 30 years of Aluminum Connector manufacture.

Insuring "high density" by completely eliminating *pin-hole gas porosity* in aluminum castings is just one of Anderson's check-point measures in the production of connectors of outstanding quality. Every heat of aluminum is checked to guarantee that no connector will fail in service because of *voids* in the casting created by *tiny gas bubbles!*

Any Anderson Representative can give you the full, detailed story of our exacting QUALITY CONTROL measures . . . consult your nearest Representative or write to the home office.

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ANDERSON ELECTRIC

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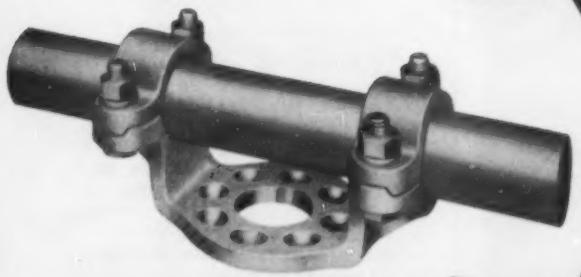

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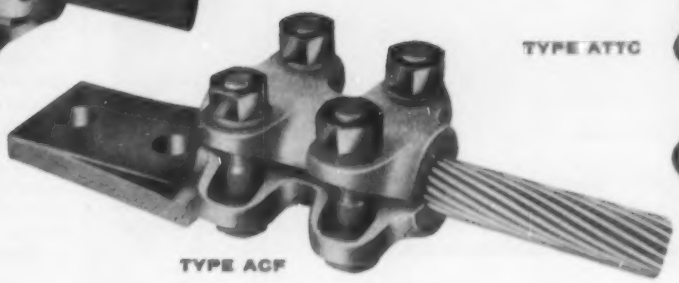

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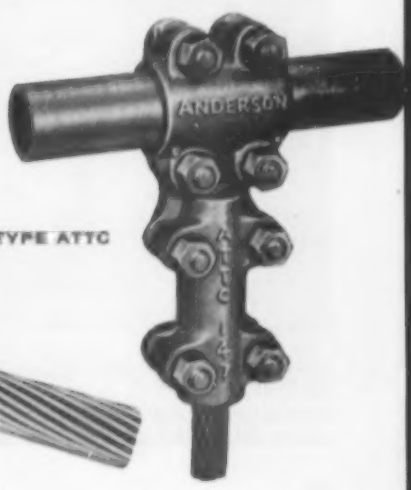


TYPE ATTC

tivities of the Association's standing committees by D. C. Duncan, H. D. Stillman, M. J. Barth, R. R. Jewell and L. L. Koontz.

New ballast warranty replacement plan

AN UNUSUAL new plan for making immediate, free replacements to electrical contractors of any in-warranty defective Sola fluorescent ballast has been put into effect by the Sola Electric Co., Chicago.

Nelson P. Marshall, Sola's general sales manager, points out an unusual feature of the Sola ballast service plan. The company authorizes any qualified electrical wholesaler to make in-warranty replacement with a certified CBM ballast of another make if Sola ballasts are not stocked. Mr. Marshall states that this makes it possible for electrical contractors to get immediate replacements for Sola ballasts from any qualified wholesaler in the U.S.A. who stocks certified CBM ballasts for over-the-counter sale. The wholesaler does not have to stock Sola ballasts to qualify.

There is no charge to electrical contractors for making these in-warranty replacements. The contractor merely signs a receipt and takes the replacement ballast with him.

Mobile lighting unit now touring South

LIGHTING its way through Georgia now is the new Edwin F. Guth Company Travelcade of Lighting. Under the direction of Guy Johnson, Guth's new Georgia representative, this lighting merchandiser is attempting to bring Southern wholesalers, distributors, engineers, and architects first hand information on Guth lighting fixtures.

The compact and mobile unit provides valuable assistance in disseminating the latest story on luminaires, from massive ceiling installations to ecclesiastical lighting. It enables interested lighting men to conveniently get down to the brass tacks of business in a congenial and private atmosphere. And according to Edwin F. Guth, the Travelcade of Lighting leads to a mutual understanding and solution of both the fixture manufacturer's problems and those of the distributors and builders.

Brief news notes of manufacturers

CONSTRUCTION has started on a 29,000-square foot building at 7600 Sovereign Row that will almost triple the building area occupied in Dallas' Brook Hollow Industrial District by Progress Manufacturing Co.

The move from the company's present 10,000-square foot building—expected to be made January 1—was made necessary by a 35 per cent increase in business through the Dallas-based Southwestern headquarters of Progress Manufacturing in the past year, plus the company's acquisition of a California company, according to Will Turner, Southwestern district manager.

Maurice Rosen, Progress Manufacturing Company president who was in Dallas recently on a visit from the firm's Philadelphia headquarters, "was so well impressed with the facilities of Brook Hollow and the way in which they have aided us in recording a substantial increase in business that he strongly recommended the construction of our new, larger quarters in Brook Hollow," Mr. Turner added.

* * *

ESSEX Wire Corp., Ft. Wayne, Ind., has announced the merger of Midland Wire Corp., Tiffin, Ohio, and Midland Wire Division, Essex Wire Corp., Birmingham, Ala., with its Paranite Wire and Cable Division.

Effective October 1, 1956, all business is now conducted by and referred to as the Paranite Wire and Cable Division, Essex Wire Corp., Ft. Wayne, Ind.

Midland's products, transmission and distribution cable, will be combined with the Paranite line of electrical wire and cable.

* * *

THE FAMILY of the late Reuben B. Benjamin, a leading inventor in the electrical field who held a number of patents including those for the two way plug and the wireless cluster, has completely disposed of its holdings in the company he founded, Benjamin Electric Manufacturing Co., Des Plaines, Ill.

His son, R. Allen Benjamin, has announced completion of negotiations in which all of the family's holdings were sold to the company. Mr. Benjamin did not disclose the sale price but said that the holding comprised the largest single block of ownership in the corporation.

Included was approximately one third of Benjamin Electric's common stock and about one fifth of the preferred stock, he said. R. Allen Benjamin formerly was secretary of the company and vice-president in charge of engineering and production control.

* * *

T. J. COPE, Inc., has consolidated all executive, sales, engineering, production, receiving, and shipping operations in its new plant in Collegeville, Pa., according to E. W. Baird, Jr., president. The new facilities provide badly needed office space and a four-fold increase in production capacity.

Cope has been known for more than 75 years as a manufacturer of underground cable installation equipment. Since World War II, however, the greatly increasing sales of its cable trough line has outstripped sales of its underground cable installation equipment.

According to Mr. Baird, the old

This picture as made during a Travelcade of Lighting visit to Albany, Ga. The mobile unit is currently touring Georgia under the sponsorship of Edwin F. Guth Co., St. Louis. Included in the group are local wholesalers, distributors, engineers, and architects.

Cope address in Philadelphia will be discontinued permanently. In Collegeville, the firm remains in the Greater Philadelphia area.

* * *

A NEW ADDITION to Reynolds Metals Company's aluminum wire and cable mill in Sheffield, Ala., for production of neoprene and polyethylene covered and insulated electrical conductors is nearing completion, according to an announcement by J. Louis Reynolds, the firm's executive vice-president.

The facilities are housed in a new building, bringing total floor space of the overall cable operation to 174,000 square feet. New equipment for applying thermosetting and thermoplastic coverings will be used initially for neoprene and polyethylene insulation. Equipment for fabricating self-supporting aerial secondary cables also has been installed.

Dates Ahead

American Institute of Electrical Engineers, Winter Meeting, Hotel Statler, New York, N. Y., Jan. 21-25, 1957.

Southeastern Electrical Wholesalers Association, Seventh Annual "Industry Day" Meeting, Atlanta Biltmore Hotel, Atlanta, Ga., Jan. 24-25, 1957.

National Association of Purchasing Agents, Public Utility Buyers' Group, 26th Annual Mid-Winter Conference, Brown Hotel, Louisville, Ky., Feb. 3-5, 1957.

Air Conditioning, Ventilating and Electric Space Heating Exposition, Sheraton Park Hotel, Washington, D. C., Feb. 8-10, 1957.

The Electrical Trade Conference and Exposition, Shoreham Hotel, Washington, D. C., Feb. 12-14, 1957.

Southern Safety Conference and Exposition, John Marshall Hotel, Richmond, Va., March 3-5, 1957.

Oklahoma Utilities Association, Annual Convention, Tulsa Hotel, Tulsa, Okla., March 28-29, 1957.

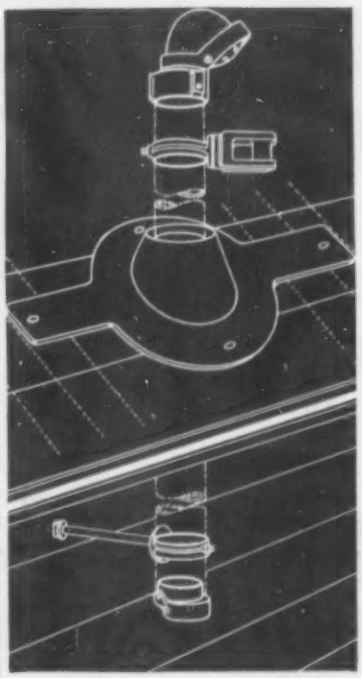
Southeastern Electric Exchange, 24th Annual Conference, Boca Raton Hotel & Club, Boca Raton, Fla., April 1-3, 1957.

M&W Entrance Mast Kits include

New **combination roof plate and flashing**

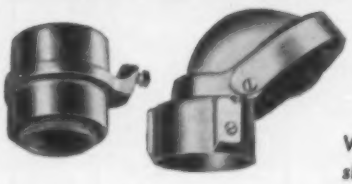
ONE-PIECE Fitting assures faster, better installations

This new-improved plate, which supports pipe at highest point above flashing, reduces lever action and permits greater strain load without bending mast. Withstands up to 2500 lb. pull in actual tests.



Cut service installation time with M&W's new improved mast kit fittings. The combination, one-piece-cast roof plate and flashing completely eliminates separate collar and flashing operations. Lag-screw to roof and a weathertight compound seal are the only steps needed to complete an easy installation that adds extra rigidity and time-savings.

. . . And you save *even more* . . . with the new M&W Combination Service Entrance Head and Slip-fitter. Installs in seconds! Just slip the fitting onto the unthreaded conduit. Tighten the set-screws. That's all! No thread cutting; no separate parts to juggle. What's more, you make a simple, neat, dependable one-piece installation—all in a jiffy.



Start saving now . . . use M&W Mast Kits for *every* entrance installation. All fittings are available as separate fittings or in kit form, for 2" or 2½" conduit and pipe ring or strap and lag screw installations.

Write today for details and latest catalog showing the complete line of M&W Fittings.

M&W Electrical Fittings
The M. & W. ELECTRIC MFG. CO., Inc.
EAST PALESTINE, OHIO

PORCELAIN PRODUCTS' Service Mast KIT

MAKES INSTALLATION FASTER...EASIER

STANDARD FOR 2" PIPE

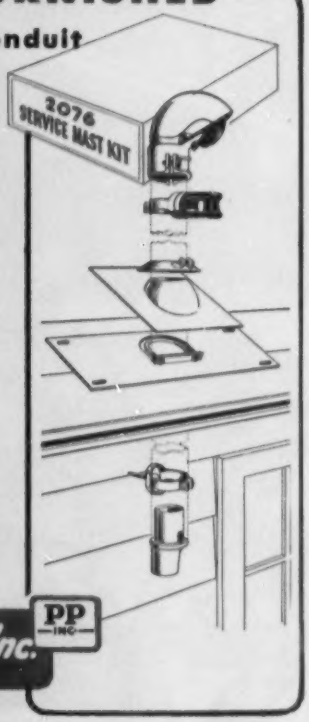
Also available FOR 2½" PIPE

EVERYTHING FURNISHED

but the house and conduit

Here is the *only* Service Entrance Mast Kit complete in *every* detail—including roof flashing—even necessary bolts, nuts, lag screws and nails. Can be *installed* by an *electrician, with electricians tools.*

Cut down installation costs with these easier, quicker to install, service entrance mast kits.



CHECK THIS LIST OF COMPLETE PARTS

- √ 1¼" Vise-Grip Service Entrance Cap that fits a 2" pipe
- √ Galvanized Roof Flashing and Storm Collar
- √ Roof Mounting Plate of new and original design
- √ Conduit hanger with 2¼" lag screw attached
- √ Slip-fitting offset reducer with interior grounding device
- √ Non-hardening roof sealing compound
- √ All necessary bolts, nuts, lag screws and nails
- √ Plus—Porcelain Products famous 2061-C Pipe Mounting house brackets as specified

WRITE FOR DETAILS TODAY!

62 years

Porcelain Products, Inc.

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PP INC

Statement of Ownership

STATEMENT required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of ELECTRICAL SOUTH published monthly at Dalton, Ga., for October 1, 1956.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: publisher, W. R. C. Smith Publishing Co., Atlanta, Ga.; editor, Carl W. Evans, Atlanta, Ga.; business manager, Frank P. Bell, Atlanta, Ga.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) W. R. C. Smith Publishing Company, Atlanta, Ga.; Estate of W. R. C. Smith, Atlanta, Ga.; O. A. Sharpless, Atlanta, Ga.; T. W. McAllister, Orlando, Fla.; W. J. Rooke, Atlanta, Ga.; E. W. O'Brien, Atlanta, Ga.; J. C. Cook, Atlanta, Ga.; R. P. Smith, Atlanta, Ga.; Mrs. E. L. Philpot, Atlanta, Ga.; Mrs. Seba Jones, Atlanta, Ga.; A. F. Roberts, Atlanta, Ga., and Wm. C. Herbert, Atlanta, Ga.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.) Frank P. Bell, Business Manager.

Sworn to and subscribed before me this 1st day of October, 1956, Seba J. Jones, (My commission expires Feb. 23, 1958).

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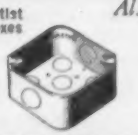

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News about people

Edward J. Good has been elected vice-president in charge of Sales of **Louisville Gas and Electric Co.** The announcement was made by T. B. Wilson, president, following a meeting of the board of directors. Mr. Good began his utility career twenty-nine years ago and held several positions in utility sales including manager of Electric Sales, and general sales manager of the company.

At various times Mr. Good has been active in charitable and civic

Edward J. Good

projects in the Louisville area, and served in the Army from February 1943 to November 1945 in the European theatre.

Mr. Good replaces **J. R. Ramage,** vice-president in charge of sales who retired in October after 45 years with Louisville Gas and Electric Company and one of its predecessor companies, Louisville Lighting Co. A pioneer in utility sales, Mr. Ramage spent much time and made many trips with others interested in locating new industries in the Louisville area. Mr. Ramage made many friends among the industrial customers of his company during his near half-century sales career.

The appointment of **Gordon W. Butler** to St. Louis district sales manager for the **Westinghouse Lamp Division** was announced recently by Frank C. Cline, Southwestern Region sales manager.

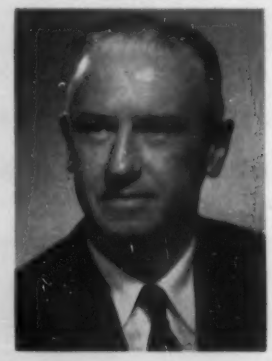
Mr. Butler will make his headquarters at the company's sales offices in St. Louis. He will be responsible for the sale of all products of the Westinghouse Lamp Division including fluorescent and mercury vapor lamps, incandescent light bulbs, automotive and miniature lamps and photolamps.

In 1939 Mr. Butler accepted a position with Westinghouse as sales representative for the Lamp Division in the Kansas City district. In 1941 he was transferred to the Memphis area and in 1948 he was assigned to the Wichita office. In 1955 he was promoted to assistant to the Southwestern region manager.

Harold F. Rozier has been promoted to system distribution engineer of **Appalachian Electric Power Company** at Roanoke, Va., succeeding **John F. Nash,** who died Sept. 12. He formerly was assistant system distribution engineer.

W. E. Hollingsworth, a native Georgian and an electrical engineer of wide experience, is the new vice-president and Augusta division manager of the **Georgia Power Co.** He succeeded **T. A. Gibson** who retired under the provisions of the company's retirement plan. Mr. Hollingsworth, who has been in Augusta since 1953 as assistant division manager, was elected a vice-president at a recent meeting of the company's board of directors.

Mr. Hollingsworth was born in Fayette county in 1901 and attended public schools in Ocilla. He continued his education at the Marion Institute, Marion, Ala., and the U. S. Naval Academy at Annapolis. He joined a predecessor of the Georgia Power Company in 1926 as local man-



W. E. Hollingsworth

ager at Ocilla. In 1935 he was promoted to Tifton district manager, in 1936 to assistant superintendent of the Columbus division, in 1937 to assistant superintendent of the Macon division, and in 1946 to Macon division superintendent. He was assigned to Augusta May 1, 1953, as assistant division manager.

Mr. Gibson, a native of Macon, attended public schools in that city and was graduated from Georgia Tech in 1914 with the degree of Bachelor of Science in electrical engineering. He joined the Georgia Power Company as Athens division superintendent when the electric system there was acquired in 1926. He became Athens division manager in 1935 and a vice-president in 1936. In October of the following year he was transferred to Augusta as vice-president and division manager.

Henry F. Callahan has been appointed general manager of the Lighting Division of **Sylvania Electric Products Inc.,** it has been announced by Frank J. Healy, Sylvania vice-president—Operations in charge of the Lighting Division.

Mr. Callahan has been general manufacturing manager of the division since September, 1947. In his new position, he has been assigned by Mr. Healy to management responsibilities in various other major areas of the division's operations, in addition to manufacturing.

Mr. Callahan joined Sylvania in September, 1923, as a cooperative

Henry F. Callahan

student engineer in the "work-study" program at Northeastern University. He became a member of the engineering department in 1926, following his graduation from Northeastern, and has been with the company continuously since that time. His career with Sylvania embraces a wide background in both engineering and manufacturing administration, and his experience covers direct contact with almost every product of the Lighting Division as well as with radio tube manufacture. He was a pioneer in launching the production of both fluorescent lamps and fluorescent lighting fixtures, and in the past served as plant manager in both the Ipswich and Danvers plants.

He will continue to maintain his office at the Boston Street, Salem plant where headquarters of the Lighting Division are located.

The appointment of **Thomas M. Wallace** as manager of manufacturing for the **General Electric Company's** Large Lamp Department, Nela Park, Cleveland, has been announced by

Herman L. Weiss, department general manager.

Mr. Wallace succeeds **Henry F. DeLong,** who moves up to the position of general manager of the Cathode Ray Tube Department of the G-E Electronics Components Division, Electronics Park, Syracuse, N. Y.

Mr. Wallace was formerly manager of manufacturing for the Miniature Lamp Department at Nela Park. Succeeding him in that position is **Donald J. Mayer,** who moves up from his post as manager of Large Lamp Warehousing and Field Services.

I-T-E Circuit Breaker Co. of Philadelphia, has announced three organization changes resulting from its acquisition, late in July, of the Kelman Electric & Manufacturing Co. of Los Angeles, Calif. Kelman is a fifty-year old producer of high voltage oil circuit breakers which have been marketed on the West Coast. It will operate as a subsidiary company of I-T-E which, beside operating divisions in Philadelphia; Greensburg, Pa.; and Victor, N. Y,; also has subsidiaries in Detroit, Mich.; in Newburyport, Mass.; In Ohio; and in Canada.

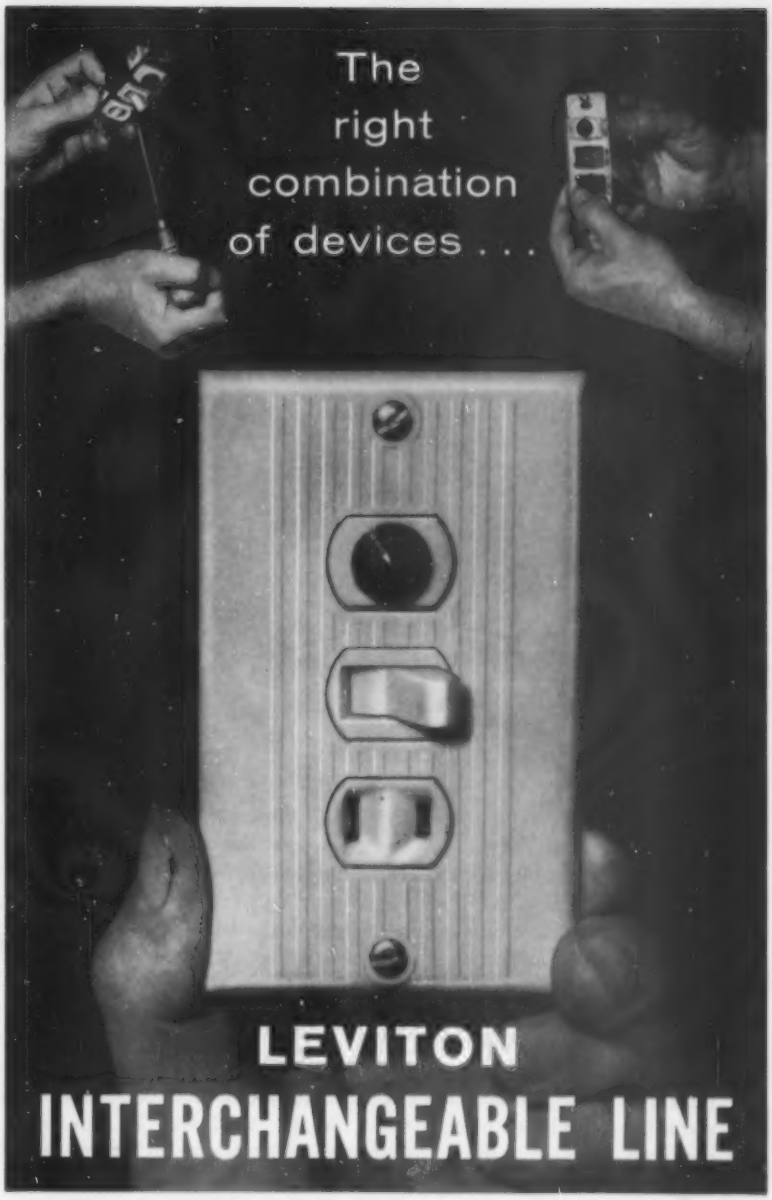
Harry L. Buck, the newly-acquired firm's president, announced the appointment of **A. E. Mackenzie** as its vice-president and general manager. Mr. Mackenzie has been associated with I-T-E since 1944, most recently as the district manager of its New York office. He is a native of the State of Washington, and a graduate electrical engineer from the University of Washington. He was engaged in manufacturing and plant management in the Northwest before joining I-T-E.

Leo H. Lipscomb, the parent firm's vice-president of Sales, made simultaneous announcement of two New York office appointments: **John H. Kuhns,** formerly assistant manager of this office, replaces Mr. Mackenzie as district manager. Mr. Kuhns has been associated with the R&IE Equipment Division and with I-T-E for more than thirty-five years.

James E. Bevan, formerly a market specialist there, becomes assistant district manager of the New York office. A graduate electrical engineer, he has been associated with the company in various sales as well as in engineering capacities for about 7 years.

Smithcraft Lighting Division has announced appointment of **Donald G. Hallmark** as representative in Alabama (except Mobile and Baldwin Counties) and in northwest Florida.

Mr. Hallmark graduated from Alabama Polytechnic Institute in 1949, with a degree of Bachelor in Electrical Engineering. He has worked for the General Electric Supply Company as lighting specialist.



Now, a newly designed series of devices that can be made up in combination and installed right on the job with a minimum of inventory and a maximum of efficiency. Any combination of one, two or three devices on a single gang can be assembled quickly and easily. Each device locks into the strap with a twist of the screw driver.

With the Leviton Interchangeable Line, you get the devices you want in the combination that is right for the job. And these devices are also interchangeable with other devices of the same type for replacement purposes.

Select from a wide variety of Interchangeable components including Single pole, Double pole, 3-way and 4-way switches; Convenience outlets; Push button; Pilot light; Duplex and Triple outlets.

Devices fit standard boxes and wall plates. Available in brown or ivory phenolic. Newly designed wall plates in metal or phenolic are simply styled, easily cleaned. Listed by Underwriters' Laboratories.

Your best jobs are done with ... **LEVITON**

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Made to surpass the most rigid requirements of specification wiring jobs, P&S Super AC Switches can't be matched for durability, dependability and versatility of application. Use them AT FULL RATED CAPACITY for tungsten filament lamp loads, fluorescent installations, and at 80% of the switch rating on motor loads—the highest rating the National Electrical Code permits. Heavy Silver-alloy contacts keep temperature rise at a minimum . . . a P&S Super Switch will handle full amperage 24-hours-a-day, seven-days-a-week.

The *extra-heavy* plastic body is designed to take more punishment than you could possibly give it. Its unique construction makes it virtually noiseless in operation. Totally enclosed, it can be mounted in any position. Write for information, including the report of the Underwriters' Laboratory Tests, to Dept. ES-15.

Positive kick-off.
Extra large terminal screws.
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Contacts in upright position mounted at point of least vibration.
Extra large silver buttons.
Contoured back for additional wiring room.

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Free bulletins

For electric utilities and large industrials having generating plants, **Multi-Amp Corp.,** 10 third St., Newark, N. J., now has available a complete catalog of **test instruments for testing and calibrating current actuated protective devices.**

In presenting Multi-Amp's full line of standard and special equipment for safety testing protective relays, oil circuit reclosers and related devices, the catalog contains product descriptions, application recommendations, illustrations, schematic diagrams and essential technical data of interest to public utilities and electrical maintenance personnel of large plants and industries.

The catalog contains a recapitulation of relay testing practice today, with recommendations on rapid and safe new techniques to inspect critical protective equipment on installation and periodically thereafter.

For additional data, ask for item B-1111, using the coupon on page 123.

The Capacitor Digest, a collection of some of the best, recent trade-magazine stories on the subject of industrial capacitors, is now available from **General Electric Co.,** Schenectady 5, N. Y.

Stories in the digest are designed to point out how industrial capacitors installed at the load in a plant can pay a high return in power cost savings, released additional capacity, and better operating conditions.

For additional data, ask for item B-1112, using the coupon on page 123.

A six-page bulletin, No. L-110-C, describing Corning Pattern Number 83 Crysta-lite—**a new prismatic-fluted glass for fluorescent fixture lighting panels**—is now available.

Crysta-lite is recommended by the Lighting Sales Dept., **Corning Glass Works,** Corning, N. Y., for large area general lighting applications.

Complete photometric data are given for two lamp 12-inch troffers, three lamp 12-inch troffers and four lamp 24-inch troffers. Included are brightness and distribution data, testing conditions and coefficients of utilization. There is also an illumination level calculating sheet.

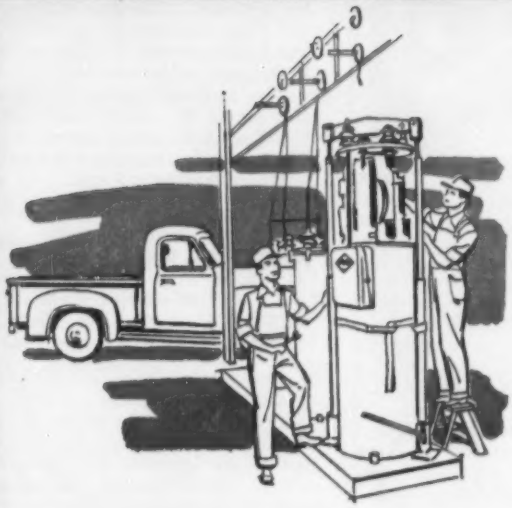
For additional data, ask for item B-1113, using the coupon on page 123.

Operating features of **Allis-Chalmers** oil and "Chlorextol" **liquid-filled and sealed dry-type transformers** are discussed in a new **24-page** bulletin released by the company.

The well illustrated bulletin describes the electrical assembly of the units, tap changer and tank design.

Compare Allis-Chalmers Regulators with Others

Slash Regulator Service Costs 75%



THIS

On-the-spot service with Allis-Chalmers cover-suspended regulators—2-man crew and pickup truck does the job without moving unit.

OR THIS

Other regulators usually require a 4 or 5-man crew and boom truck to move regulator and do piecemeal untanking and retanking.

1—Drain oil from tank

2—Remove cover, bushings and control leads

3—Piecemeal untanking

Eliminates need for moving and piecemeal untanking which costs 4 to 5 times more!

This is the key to savings with Allis-Chalmers regulators! Unit construction makes it possible. A 2-man crew using a pickup truck (not a boom truck) can switch the regulator off the line, set up the portable hydraulic jack and in a few minutes lift the entire regulator mechanism far enough out of the tank for inspection. Only Allis-Chalmers regulators provide full unit construction.

For complete information, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

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and the transformers' compact construction, mechanism and conveniently located accessories. Procedure used in shipping the transformers is also covered.

Copies of "Allis-Chalmers Network Transformers," bulletin 61B6152B, are available on request from Allis-Chalmers Manufacturing Co., 938 S. 70th Street, Milwaukee, Wisc.

For additional data, ask for item B-1114, using the coupon on page 123.

Literature is now available describing the "H" series of **sensitive Hipot testers** from **Peschel Electronics, Inc.**, 16 Garden Street, New Rochelle, N. Y.

Hipot testing allows convenient and accurate dielectric testing of equipment, components and materials. With a Series "H" Hipot tester, the high sensitivity shows up leakage currents in insulation which appear to be perfect on less sensitive instruments. The electronic circuit breaker in the tester deenergizes the HV at the instant that 5 microamps of leakage current occurs in the sample under test, and prevents destructive arcs.

For additional data, ask for item B-1115, using the coupon on page 123.

Cutler-Hammer, Inc., 233 N. 12th St., Milwaukee, Wisc., has announced that several new features have been incorporated into their Bulletin 9586 **a-c magnetic motor starter.** Still retaining the outstanding features of "Three Star Motor Control" quality, the Bulletin 9586 now has improved pressure type terminals; a snap-on contact block cover which locks into place and yet provides for instantaneous inspection and contact servicing; an exclusive visual or audible alarm circuit; and a new plastic-covered coil insulation, vacuum impregnated and standard in three colors. Write for publication EE-191.

For additional data, ask for item B-1116, using the coupon on page 123.

The Alkco Catalog for 1956, describing their complete line of **fluorescent and incandescent lighting fixtures,** has recently been released by **Alkco Manufacturing Co.**, 4242 Lincoln Ave., Chicago 18, Ill.

Sections on custom-made lighting equipment, under-cabinet lights, illuminated directional signs, and a price list are included in the catalog.

For additional data, ask for item B-1117, using the coupon on page 123.

A brochure covering their new 400 kw, 500 kva, 60-cycle **generator series** is available by writing Dept. r-c **Kato Engineering Co.**, Mankato, Minn.

For additional data, ask for item B-1118, using the coupon on page 123.

Technical books

for the electrical man

Calculating room lighting

Published by Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., $.50.

An entirely new, simplified and more accurate method for making lighting calculations for interiors has been introduced by the IES Committee on Lighting Design Practice in the new report, "Calculating Coefficients of Utilization."

The new method is a departure from the "Lumen Method" adopted in 1920 in that ceilings of over 80 per cent reflectance (rather than the then average of 75 per cent) are now common. Use of the figure will lessen the effect of resulting calculated coefficients of utilization being unnecessarily conservative when the ceiling is white. This higher ceiling reflectance also increases the reflectance from floor surfaces. Technicians now computing coefficients of utilization thus attain more accurate figures with the new method.

The report, "Calculating Coefficients of Utilization," in addition to explaining the basic method, includes complete work sheets with step-by-step instructions for their use; numerous charts showing a variety of room ratios based on reflectances and type of luminaire.

Electrical Testing and Troubleshooting

By Philip T. Green, Published by The Industrial Press, 93 Worth St., New York 13, New York, 191 pages, $4.00.

Electrical Testing and Troubleshooting explains how to locate and correct faults in circuits of all kinds, including controllers, motors, transformers and transmission lines. The book opens with a simplified briefing on electrical symbols and diagrams, followed by detailed discussions on the book's many topics. It is written in easily understandable terms so that only a basic knowledge of simple arithmetic is necessary to use and understand the principles and procedures set forth. All of the troubleshooting procedures described have been tested in the field, and were proven to be great time-savers, especially for locating obscure sources of trouble.

From the standpoint of personnel safety, an outstanding feature of this book is that most of the test can be performed with the equipment isolated from the power line. Current for these tests is supplied by dry cells or residual magnetism, so that accidental contact and short circuits are less hazardous to both men and machines.

The author, Philip T. Green, is Industrial Training Coordinator of the Panama Canal Zone Co., and has a wide background in electrical engineering.

NEC 1956 Revisions

By H. P. Michener, Published by NEMA, 155 E. 44th St., New York 17, N. Y., 45 pages, $.25.

Analysis of 1956 Revision of the National Electrical Code, the latest in a 25-year series of reference reviews of Code revisions published by the National Electrical Manufacturers Association, has been completed and now is available, it is announced by the NEMA Engineering and Safety Regulation Department.

The booklet was compiled by H. P. Michener, assistant manager of the NEMA department, working from page proofs of the Code and other official Code documents.

The National Electrical Code is the authority on electrical safety and a document which controls the installation of electrical equipment throughout the country. Therefore, it is of prime importance to the electrical industry, and changes which occur in it affect contractors, inspectors, manufacturers and utilities alike.

The NEMA booklet details all changes made in the former edition and eliminates the need for each Code user to make painstaking comparisons between the new and old documents. It is not intended as an authoritative interpretation of the Code changes. Its intent is to show the nature of the changes which have occurred in the Code since the 1953 edition. In those cases where the reason for the revision may not be obvious from the text of the revision, a brief explanation is given in the analysis.

While Code changes this year are not as extensive as in some past revisions, there have been a number of changes of importance, including such items as new

tables for aluminum conductors, revised running currents for direct-current motors up to 3 horsepower and for singlephase motors up to 1½ horsepower, new definitions of service entrance conductors, recognition of the new rubber-covered wire having a 90° C limitation and further extension of the required usage of grounding type receptacles for portable equipment.

All these and nearly 175 other Code changes are noted in this 45-page, 4¾ x 7 inch pocket size pamphlet.

Radio Electronics

By Samuel Seely, Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y., 487 pages, $7.00

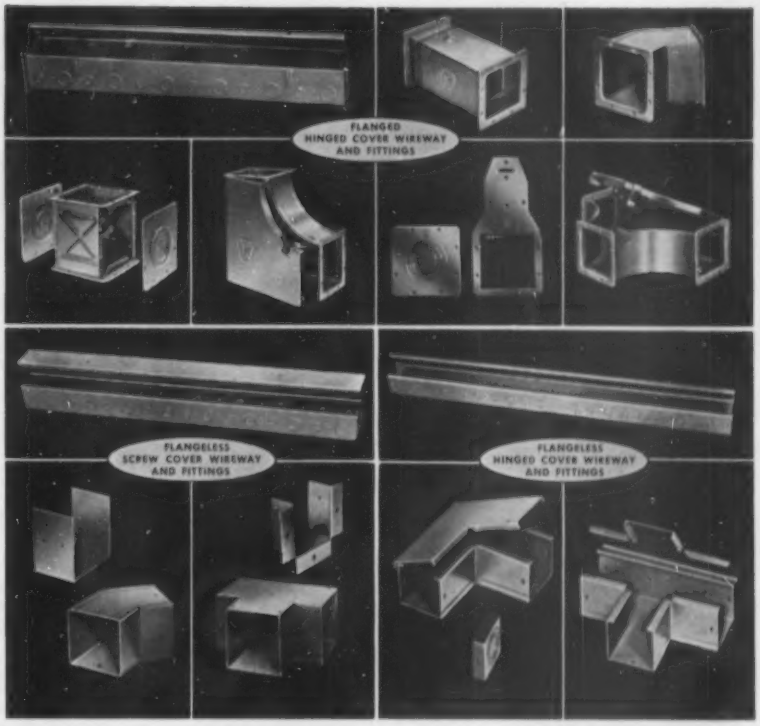
The author treats in considerable mathematical detail the essential processes and circuits which are of importance in the field of radio communications. A general discussion of the important methods of communication is followed by a detailed discussion of the more important aspects of the field.

Emphasis is on the physical and mathematical analyses, to give the reader an understanding of the fundamentals underlying the broad field of communication. Because the author employs a new approach, that of stressing the techniques of analysis, occasional alternate mathematical developments are included in order to illustrate the applicability of the different techniques of analysis.

Although radio electronics and electronic engineering were written as companion volumes, they are independent of each other. Together they represent a revision and extension of the author's electron-tube circuits.

Because the two books are designed to be used separately, a certain amount of material is common to both. The amount of duplicated material, however, has been kept to a minimum, consistent with the desire to have the books independent and also to provide a complete and continuous development.

Special features of Radio Electronics include a considerably more comprehensive discussion than is ordinarily available on feedback in amplifiers, and the ratio detector and the Bradley detector in frequency modulation detection. Among the new advances covered is Information Theory. A chapter on this subject relates some of the results of this theory with different types of communication systems. Illustrative analyses are frequently given to relate the theoretical considerations to practical situations.



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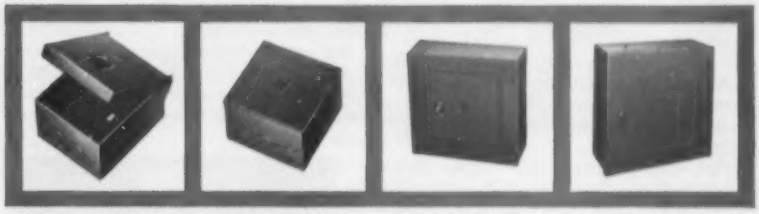

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. . . the Complete Line of Wiring Installation Equipment

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New products

Indicating lamp permits control circuit check

WHEN CONTROL circuit trouble is suspected, a new "push-to-test" oil-tight indicating light available from Standard Control Div., Westinghouse Electric Corp., Beaver, Pa., permits the machine operator or maintenance man to check whether an unlit indicator lamp is an indication of trouble or merely the result of a lamp failure.

By pressing the lens of the new indicator light, the operator transfers

the lamp from its normal circuit to a separate built-in lamp test circuit. If the lamp is functioning, it will light normally to indicate that trouble shooting is in order. If it fails to light, replacement of the lamp is possible without appreciable expenditure of time by maintenance personnel.

The new push-to-test indicating lights are of the transformer type and are available for 110-, 220-, and 440-volt applications. Open, cover, or panel-mounting units are available; dimensions are identical with standard units of corresponding types.

For additional data, ask for item P-1119, using the coupon on page 123.

Improved grounding caps provide safety features

THE ARROW-HART & Hegeman Electric Co., Hartford, Conn., announces the availability of a new, improved line of 3-wire, 2-wire grounding caps which, it is stated, will assure positive polarity and proper grounding of electrical equipment at all times. This line meets the National Electrical Code requirements and is approved by the Underwriters' Laboratories.

This new line of grounding caps includes both the rubber type with sliding cord grip and the armour-over-rubber interior with sliding cord grip designed to withstand strenuous wear. A unique safety feature of both types, claimed as an Arrow-Hart exclusive, is a rubber rim extending ⅛" above the face of the cap and adding 1/32" to the circumference, an important finger grip and insulation factor.

The most recent addition to the complete line of grounding caps pioneered by Arrow-Hart, these 3-wire, 2-wire grounding caps are available with parallel or tandem blades, in 15 ampere, 125 volt and 15 ampere, 250 volt.

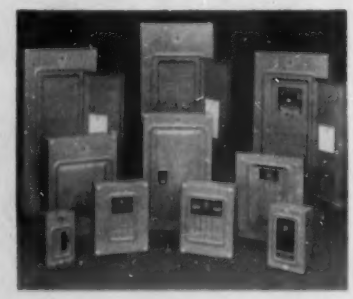
For additional data, ask for item P-1120, using the coupon on page 123.

New load center line announced by Square D

A COMPLETE LINE of load centers, from 2 to 42 circuits, featuring the QO panelboard breaker, has been announced by the Square D Co., 6060 Rivard St., Detroit 11, Mich.

The QO breaker was first introduced over a year ago in Square D's NQO panelboards. Since then, a new fully automated circuit breaker plant in Cedar Rapids has made it possible to furnish this breaker in moderately priced load centers.

The QO's Swingrip mounting feature assures proper positioning of the breaker and a firm, positive connection in one simple, natural operation. Its non-interchangeability feature discourages the substitution of 30, 40 or 50 amp breakers where 15 or 20 amp devices originally have been in-



stalled. In addition, the QO incorporates quick-make and quick-break, ambient-compensated and thermal-magnetic features.

The QO's use in the new, complete load center line makes available a wide range of devices for residential, commercial, and light industrial applications. Flush, surface and raintight devices are available, lugs only, split bus or main breaker types. Two to 8 circuit devices are available without doors, while 12, 20, 30 and 42 circuit devices are furnished with doors.

Doors are automatically furnished with a spring catch which can be replaced by a flush panel-type lock. This replacement is made simply by removing one twistout. The lock is "keyed" to match Square D panelboards.

The QO line is UL approved and meets Federal Specifications WP-131A, Class A. The complete range of devices is available off-the-shelf from authorized Square D distributors.

For additional data, ask for item P-1121, using the coupon on page 123.

Switch and outlet on a single device

NEWLY ADDED by Leviton Manufacturing Co., Brooklyn 22, N.Y., to its line of U-grounded devices, is a new combination single-pole switch and a U-ground outlet on a single device.

Ideal for use with portable power tools, air conditioners and other heavy appliances, the No. 5219 can be wired so that the outlet can either be controlled by the switch or independent of the switch. The switch

is T rated and the outlet has double-wiping phosphor bronze contacts. It is available with cover and toggle in brown phenolic or ivory thermosetting plastic. Constructed for heavy-duty use, the device has a heavy underslung strap, connected to the grounding terminal and solidly riveted to cover and base.

Other features include extra large terminal screws with deep milled slots for easy installation, plastic ears and mounting screws already inserted in the strap.

The switch is rated 10 amp - 125vt, 5 amp - 125v, and the outlet is 15 amp - 125v. Listed by Underwriters' Laboratories, all U-ground devices in the Leviton catalog conform to R.E.A. and Federal specifications.

For additional data, ask for item P-1122, using the coupon on page 123.

Three new systems for factory lighting

THREE NEW Benjamin fluorescent lighting systems which enable buyers of factory lighting equipment to take maximum advantage of many important advancements in industrial lighting are now available, according to an announcement by the Benjamin Electric Mfg. Co., Des Plaines, Ill. The new systems include (1) Benjamin RLM Twin-Flo SD-1, semi-

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Conductor in contact with wedge for entire length of slider.

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direct equipment with 25% upward light, (2) Benjamin RLM equipment for 60", 90-100 watt, T-17 preheat lamps and (3) Benjamin equipment for 48" and 96", 800 ma. high output rapid-start lamps.

"Greater seeing comfort through more upward light and more light per dollar from the new higher-output 800 ma. fluorescent lamps," the Benjamin statement continues, "are among the latest advancements in factory lighting which are utilized to the fullest in these new Benjamin units."

For additional data, ask for item P-1123, using the coupon on page 123.

Snap-cover outlet for outdoor installations

A COMPLETE line of weatherproof wiring devices has been developed by Bell Electric Co., 1844 W. 21st St., Chicago, manufacturers of the "No-Shok" safety electrical devices. The new 1 and 2-gang receptacles, switches, and combination receptacles

and switches are ideal for outdoor installations or indoors wherever excessive moisture conditions exist.

Featured in the weatherproof line is a new Saf-T-Lok snap-cover outlet which locks in the open position for easy one-hand insertion of plug. The hinged snap-cover never rests on the plug or wire and therefore cannot damage the plug or insulation if cord is jerked out suddenly.

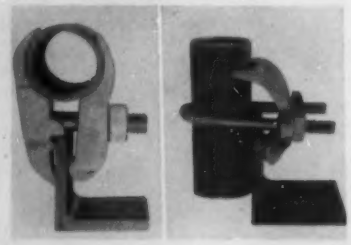
Another item in the new line is a weatherproof flush switch with a die-cast one-piece toggle lever for extra strength and durability as well as trim appearance. These two designs feature quality construction throughout; plates are of .040 solid brass, springs are of stainless steel, the rivets and screws are brass nickel plated. The lever is cast metal and all parts are coated with a special baked-on aluminum finish.

For additional data, ask for item P-1124, using the coupon on page 123.

New type conduit clamp has double steel bite

FULLMAN Manufacturing Co., 1211 Jefferson St., Latrobe, Pa., has developed a new type of pipe or conduit clamp known as the "Latrobe" which has already received wide spread acceptance.

This new "Latrobe" clamp, made of high quality malleable iron, cad-



mium plated to prevent rust, has double bite of case hardened tool steel. The safety bite is V shape to give a double bite into the steel frame to which it is attached. Attachment may be made without drilling holes in the frame work.

The clamp is made in two models; one for right angle support and one for parallel support; ten sizes for pipe or conduit from ½ inch to 4 inches.

For additional data, ask for item P-1125, using the coupon on page 123.

New fractional hp motors offered on 5-yr. guarantee

A FIVE-YEAR GUARANTEE on two new lines of 42-frame fractional horsepower motors has been offered on factory-approved applications by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

The new shaded-pole and permanent-split capacitor motors are particularly applicable to room air conditioners, unit heaters and coolers, furnace blowers, and window fans.

A new bearing and lubrications system is used in these motors. Main features are self-aligning bearings that incorporate a steel-backed, babbitt-lined sleeve bearing mounted in a die-cast spherical cup; and original oil supply in each large-capacity bearing reservoir provides ample lubrication for at least five years of normal operations. A window in the bearing assures positive contact between wick and shaft; and, grooves in the babbitted bearing provide a positive oil film between journal and bearing.

The type FE shaded-pole motor is a constant speed, switchless motor for low-power applications. It is rated 1/30 to 1/8 hp on 115 or 230 volts, 60 cycles, at 1050 rpm.

The type FLL permanent-split capacitor motor is also a constant-speed switchless motor. Its higher efficiency and power factor make it ideal as a fan drive in room air conditioners. It is rated 1/30 to 1/4 hp on 115 or 230 volts, 60 cycles, at 1075 rpm. Reversible motors can be supplied on request.

With fan load properly matched to motor output, speed control for both motors can be obtained by means of series choke, series resistance, or tapped winding. Extended studs for end mounting or rubber rings for resilient mounting are provided.

For additional data, ask for item P-1126, using the coupon on page 123.

Above ground condulet cuts installation costs

DESIGNED TO REPLACE conventional below ground manholes, type GUB above ground manhole condulet by Crouse-Hinds Co., Wolf & Seventh North Sts., Syracuse 1, N. Y., provides a simple, inexpensive means for

splicing main electrical feeder cables and making branch taps. Besides avoiding the difficulties of dealing with gas contamination or the accumulation of water which so often are present in underground manholes, the above ground feature of the new manhole cover allows maintenance personnel to easily inspect connections at any time.

The interior of the above ground manhole does not require filling with hot insulating or waterproofing compounds. Moreover, the new above ground condulets can be installed singly or in groups to accommodate the same number of feeders and branches for about one-fourth the cost of below ground manholes.

There are two styles: type GUB, a

deep-domed condulet with flametight, threaded fittings, which is explosion-proof, dust-tight, and weather-resistant for use at hazardous areas; and type WJH, a raintight condulet for installation at ordinary locations, consisting of a flat plate with deep overhanging dome cover.

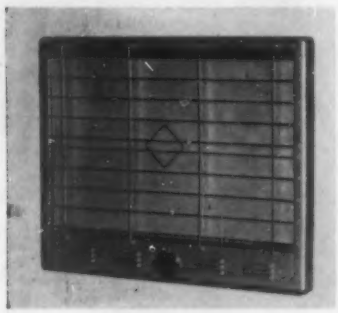
Both styles are available either with or without terminal blocks. When block-equipped, voltages up to 600 can be handled. Without blocks regular or shielded cable can be spliced for voltages up to 5,000.

Equipped with breathers and drains in order to reduce internal condensation, the type GUB above ground manhole measures 12-inches wide and, depending upon voltage requirements, 19½-inches or 34 5/16-inches in height. Type WJH condulet measures 11⅞ inches wide and either 11⅞-inches or 25⅛-inches in height, Shallow covers are used for voltages under 600, deeper covers for voltages up to 5,000.

For additional data, ask for item P-1127, using the coupon on page 123.

Thermostat and pilot light in new wall heater model

A NEW MODEL radiant electric heater utilizing the heat emitting properties of anodized aluminum and incorporating not only a thermostat, but a pilot light which glows when the unit is on, is being offered by Marviray, Inc., 54 Clifton St., Newark 5, N. J. Increaser emissivity, a "secret of nature," is utilized in a line which



includes recessed and surface mounted models, rated at 1250 and 750 watts for operation on 115, 208, 230 or 245 volts, a-c.

Completely wired, the new unit needs only to be connected to the supply circuit, a quick and simple operation. The thermostat is a double pole, single throw temperature controller, automatically cutting off the current when room temperature reaches the thermostat setting. The new radiant electric heater has been approved by the Underwriters' Laboratories, Inc.

Marviray's unique engineering includes the utilization of both the conductive and emissive powers of anodized aluminum. For proper heat distribution, the heating element is

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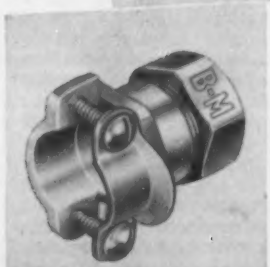
SIZES FROM ½" to 2"

SIZES ½" ¾" 1"

SIZES ½" ¾" 1" 1¼"



SIZE ½"

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completely sealed inside a specially constructed metal panel whose front surface is aluminum with an anodized finish. Unbreakable, shatterproof, the panel is safe and attractive. Handsome design marks the frame and grille which enclose it. It is a decorative adjunct to any setting as well as a clean and controllable heating unit.

For additional data, ask for item P-1128, using the coupon on page 123.

Baseboard heating display offered by Westinghouse

A NEW eye-catching display (DC-473) for baseboard heating for the home has been announced by Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa. It is designed

primarily for use by electrical contractors and contractor dealers on counters and in show windows.

The two-color easy-to-assemble display board measures 24 by 22 inches and comes equipped with a standard Westinghouse baseboard heating section. Pockets are provided on the display board to hold folders giving details on the full line of electric heating units for the home.

For additional data, ask for item P-1129, using the coupon on page 123.

Cable Spacing Guide offered by Sunwarm

A POCKET-SIZE Cable Spacing Guide for use by electrical contractors in installing ceiling heating cable, has been issued by Sunwarm, Inc., Kingsport, Tenn.

Prepared by Sunwarm's heating engineers, the plastic guide gives the "net square feet" for any size room from 4′ x 4′ to 20′ x 25′, and shows the correct spacing for radiant heating cable of varying wattages from 400 to 4400.

One edge of the heavy plastic guide is a convenient ruler, with inches marked in tenths, corresponding to the decimal graduations on the cable spacing chart.

The Guide is available to anyone in the electrical heating or contracting field for 10c to cover handling and postage.

For additional data, ask for item P-1130, using the coupon on page 123.

Improved insulation system in new G-E oil field motor

A NEW Tri-Clad 55 motor in five through 30 horsepower designed specifically for oil field applications has been announced by General Electric's Medium Induction Motor Department, Schenectady 5, N. Y.

The department said the new induction motor utilizes a newly developed insulated wire — Alkanex, making possible higher horsepower per pound and virtually eliminating burn-outs.

A synthetic enamel with a permissible operating temperature of 140 degrees C, Alkanex allows up to 40 per cent more temperature rise than ordinary wire enamel.

Described as ideally suited for the outdoor use encountered in oil field applications, the new motor is smaller and lighter in comparison to the former model, according to company engineers.

For additional data, ask for item P-1131, using the coupon on page 123.

New type heating element featured by Electromode

A NEW LINE of radiant circulating electric heaters with an entirely new type heating element, appropriately named the "Tri Core," is now being manufactured by the Electromode Division of Commercial Controls Corp., Rochester 3, N. Y. The greater efficiency of this new type heating element, which radiates two-thirds heat forward, is said to be due to its exclusive design. Heat is radiated directly into the room from the two forward sides of the Tri-Core; and the high polished reflector is so designed as to circulate the heat radiated from the third side, giving even warm air circulation throughout the entire room.

The high grade nickel chromium heating coil is supported in grooves

of the sturdily constructed ceramic core, which has high resistance to heat shock and will give long lasting use. It is guaranteed for five years. An attractive, finely designed grille shields the heating element and provides protection. Having an 82 per cent open area, it permits free flow of heated air, and is said to be the greatest free opening of any

grille material. It is easily removable for access for cleaning. A further safety feature is the enclosed connection box with terminal block which shields all electrical connections. There is no danger of shock.

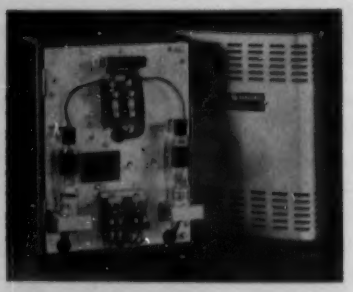
The new Electromode radiant circulating electric heaters are made in both automatic and manual models. In the automatic models, the sensitive thermostat bulb is placed at the bottom of the heater where cool air enters and is influenced only by changes in room temperature. It is made in capacities for large and small rooms, with one, two or three "Tri-Core" heating elements. The frame, which is finished in pleasing silver gray hammertone baked enamel, is adjustable to fit any type surface. Installation is simple as no pipes, ducts or chimney are required. New literature with illustrations and complete specifications is now available from the manufacturer.

For additional data, ask for item P-1132, using the coupon on page 123.

New fractional hp drives employ latest techniques

A COMPLETE new line of fractional horsepower Thy-mo-trol drives, incorporating the latest in printed circuit techniques, has been announced by General Electric's Specialty Control Department, Schenectady 5, N. Y. The new line of electronic adjustable speed drives includes both full-wave and half-wave units and spans a rating range from 1/50 to ¾ horsepower.

The new Thy-mo-trol drives employ rectified a-c to furnish d-c power to the drive motor. Very precise control of speed is obtained and constant torque is supplied over the entire speed range, according to G-E engineers. Desired speed can be preset from a remote location if desired —with a speed control potentiometer mounted in the control sation. Stepless speed control permits any infinite variety of speed settings within the rated range of the drive.



General Electric engineers point out that one of the most important features of the new line is the use of plug-in printed circuit boards in the half-wave equipments. These boards permit assembly and disassembly of the basic panel without removal of a single wire. In addition, the printed board itself can be rapidly removed from the sub-panel and replaced as a unit without removal of wires. This quick change arrangement will virtually eliminate assembly line down time, General Electric predicts.

For additional data, ask for item P-1133, using the coupon on page 123.

New and improved line of single phase transformers

HEVI-DUTY Electric Co., Milwaukee 1, Wis., announces a new and improved line of single phase power and lighting transformers. This new line has 28 standard sizes of transformers from 50 va to 500 kva. These transformers have dual primary and dual secondary windings, and can also be used for 240 volt, 3 wire services.

The transformers are designed for optimum copper to core loss ratio. Exceedingly quiet operation makes them suitable for inside installation. High grade non-aging silicon steel assures low operating costs.

The core and coil is well protected in a modern, well ventilated steel case. Coils are vacuum impregnated with a polymerizing varnish and are rigidly blocked to withstand internal stress.

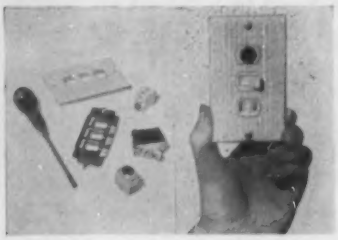
A removable top cover, clearly marked terminal leads, and a diagramatic nameplate, facilitate installation. Each transformer is designed and tested to meet or exceed NEMA, AIEE, and NEC Standards.

For additional data, ask for item P-1134, using the coupon on page 123.

Interchangeable line of wiring devices

A COMPLETE and newly designed interchangeable line of wiring devices is now available to the trade from Leviton Manufacturing Co., Brooklyn 22, N. Y.

With the interchangeable line, any combination of devices can be made up and installed right on the job with a minimum of inventory and a maximum of efficiency. Using one, two or three devices to a gang, the combinations can be assembled quickly and easily. To meet the requirements of the job, the devices needed can be selected from the full list of components. They are easily locked into the strap with a twist of the screw driver, for the right combination of devices.



The wide variety of interchangeable components includes single pole, double pole, three-way and four-way switches; convenience outlets; pilot lights; push buttons; and duplex and triple outlets. All devices are completely interchangeable with other devices of the same type.

For additional data, ask for item P-1135, using the coupon on page 123.

Plastic push button added by Rodale

RODALE Manufacturing Co., Inc., Emmaus, Pa., announces the addition of a new plastic push button to its rapidly expanding push button line. To be marketed under the trade name of "Signet," this new item has been designed to provide the consumer with a quality push button at a low cost.

Molded from high grade plastic, the "Signet" is tarnish-proof, rust-proof, and extremely durable. Only ⅞-inch wide, it is ideal for the new modern door frames and looks well with any style door hardware.

For additional data, ask for item P-1136, using the coupon on page 123.

Electric heating cable utilizes silicone rubber

A NEW ELECTRIC heating cable, Chromalox Silicone Thermwire, manufactured by Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa., utilizes the amazing heat resistant characteristics of silicone rubber to permit continued temperatures of 275° F. This new development provides a convenient and accurate method of applying or maintaining heat in pipes, vats or irregular objects where consistent high temperatures are required for controlling viscosity, chemical action and volatility in fluids.

Silicone Thermwire is a high quality nichrome resistor heating wire covered with a heavy sheath of flexible heat-resisting silicone. It provides a high dielectric strength, excellent resistance to moisture with good corrosion and abrasion qualities. Wattage output and heating ability

are determined by the length of wire used and the spacing between coils when wrapped around vats or pipes. Automatic temperature control is obtained by the use of a thermostat or percentage input controller.

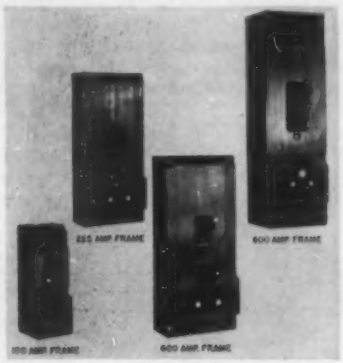
For additional data, ask for item P-1137, using the coupon on page 123.

Cordon circuit breakers available in new models

A COMPLETE line of Cordon circuit breakers—the revolutionary new, molded-case type breaker with 100,000 ampere interrupting rating—is now being produced by I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia.

Made initially in the 225 ampere frame size, the new circuit breaker is now also being manufactured in 100, 400, and 600 ampere models.

The Cordon weds a current-limiting device to a standard, molded-



case circuit breaker—both in a common molded housing—to provide a compact electrical protector with exceptionally high interrupting capacity. Other molded-case circuit breaker have maximum current interrupting ratings of only 25,000 amperes at 600 volts a-c.

The new breakers are designed for normal branch and feeder circuit applications in switchboards, panelboards, load centers, and individual enclosures.

For additional data, ask for item P-1138, using the coupon on page 123.

Color keying system designed for compression connectors

A NEW METHOD for faster and surer installation of electrical compression connectors — color keying them to their installing dies — has been announced by the Thomas & Betts Co., 72 Butler St., Elizabeth 1, N. J. The color keying system, says the company, is its latest effort to bring a degree of automation to the industry and reduce the possibilities of human error in installation.

T&B's most recent line of connectors for copper conductors employs the new color system. Each connector size in the line is marked with its

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color, and matching colors are used in a die of the installing tool. An installer selects the correct connector and die for a certain job by merely matching color.

Identification of connector sizes by color becomes automatic and speeds positive selection, says T&B. And with the right size connector installed with the correct die, a joint of high strength and low resistance is assured. The company points out that the system simplifies inspection of joints, since the color tells immediately whether or not the right connectors were used.

For additional data, ask for item P-1139, using the coupon on page 123.

New service mast fitting features fast installation

GREATER strain load without bending and faster installation are features of the new service entrance fitting by M&W Electric Manufacturing Co., Inc., East Palestine, Ohio. The one-piece, cast aluminum roof plate and flashing replace the separate collar and flashing installations and

are adaptable to various pipe diameters and roof pitches. The new fitting needs only lagging to the roof and the weatherproof compound seal to form a rugged mast installation, able to withstand up to 2500 lb. pull in actual tests.

It is available as a separate fitting or in M&W mast kits, with complete fittings for 2" or 2½" conduit and pipe ring or strap and lag screw installations.

For additional data, ask for item P-1140, using the coupon on page 123.

Wire and cable price list available to distributors

A NEW composite wire and cable price list, which gives the electrical distributor an immediate and simplified price and discount reference to frequently ordered items and cuts his clerical costs substantially, has just been published by the Hatfield Wire & Cable Division of Continental Copper and Steel Industries, Inc., Hillside, New Jersey.

The new form, identified as Distributors Composite Price List number 101-C, is printed on both sides of one 8½" x 11" sheet and contains the price and discount data on Hat-

field wire and cable products formerly covered by approximately 50

or distance. It is light in weight, too.

ELECTRICAL SOUTH
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November, 1956

Gentlemen:

Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

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HIGH IN EFFICIENCY 80.5%
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Fluorescent by Southern
Here is a fixture not only pleasing to the eye with a 45° x 45° shielding angle, but it has all the qualities of SOUTHERN'S best in design and construction. Can be wired with regular, rapid start, and slimline ballasts. These 2 lite, 4 and 8 foot fixtures are constructed of heavy guage cold rolled steel, designed for either surface (ceiling) or suspension (stem) mounting. The modern designed louvers are securely attached to the "V" type reflector forming one unit, and may be lowered from either side without the use of tools. This SCHOOLITE fixture may be joined in continuous rows without additional parts.
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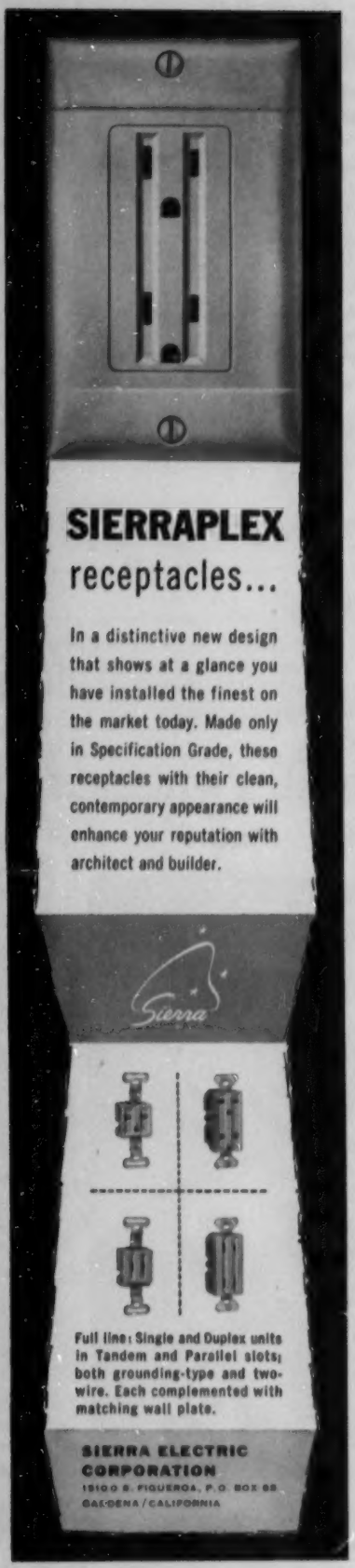
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In a distinctive new design that shows at a glance you have installed the finest on the market today. Made only in Specification Grade, these receptacles with their clean, contemporary appearance will enhance your reputation with architect and builder.
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Full line: Single and Duplex units in Tandem and Parallel slots; both grounding-type and two-wire. Each complemented with matching wall plate.
SIERRA ELECTRIC CORPORATION
GARDENA / CALIFORNIA

field wire and cable products formerly covered by approximately 50 pages. It specifies distributor resale prices and discounts on types R, RH/RW, TW, RR600 volt, RR3000 volt, RR5000 volt, nonmetallic sheathed cables types NM and NMC, service entrance cables, machine tool wires, all "S" cords, heater cords, parallel cords types S & SPT, leaded cables, both neoprene and rubber welding cables, thermostat wire, range and dryer cord sets, "BX" armored cable, armored leaded cables, bare armored ground wires, flexible steel conduit, rubber and plastic fixture wires as well as reel prices.

For additional data, ask for item P-1141, using the coupon on page 123.

Drawer type filter mounting added to ventilator line

TRADE-WIND Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif., manufacturers of home ventilating equipment, has announced the addition of a drawer type filter mounting to their line of ventilator accessories. This addition will make it possible to have easy-to-reach filters on all Trade-Wind centrifugal blower units installed in a cabinet. This feature was formerly found only in the deluxe model.

Trade-Wind Models 1501 and 2501 fit into the filter unit while the filter unit in turn fits into the hole in the bottom of the cabinet. The aluminum filter which forms the drawer is reached by simply opening the cabinet door and pulling it out.

For additional data, ask for item P-1142, using the coupon on page 123.

Load switching tool

(Continued from page 83)

feasible anywhere and everywhere up and down distribution feeders. This portability which involves bringing the interrupting unit to the disconnect (or cutout) limits the number needed, hence their cost, to the number of line trucks in service.

To provide this portability, Loadbuster, a portable loadbreak tool, was conceived by S&C engineers. It has behind it many years of exhaustive development plus testing under every conceivable condition before being pronounced ready for the industry's use.

How the tool works

The tool is, essentially, a portable load interrupting unit, or loadbreak tool, which can be carried conveniently on line trucks ready for instant use. Attached quickly to a universal pole, it can be manipulated freely, approaching the disconnect or cutout to be opened from any angle, direction, or distance. It is light in weight, too.

To break load, the tool is simply hooked across the upper contacts of an S&C disconnect or cutout which is then opened in the normal way. There's no external arc, link breakage, contact burning, or danger to the operator. A simple twist of the pole disengages the tool, releasing it for immediate loadbreak service elsewhere.

The tool can be used over and over again. It will withstand daily field use over a long period of time without requiring maintenance. On the other hand, because it is portable, it can be inspected readily and always kept in top-notch condition.

The tool provides arc-free circuit interruption at any distribution system voltage through 14,400 volts. It is able to break all load currents through 400 amperes, as well as associated magnetizing and charging currents. Moreover, it can switch all pole-top capacitor banks.

With this new portable loadbreak tool, utilities can now avoid tedious, uneconomical, and unsafe distribution load switching practices. For it operates positively and safely. It is portable. It can be used over and over again, and it is usable with both disconnects and cutouts. Load switching on distribution feeders finally becomes available in a low cost package.

Shopping center power

(Continued from page 79)

In an installation of conventional separate units, space must be provided for individual units. By having the individual units combined in a single transformer tank, space is used more efficiently. Terminations in the cover reduce the over-all space required.

Flexibility and maintenance

One of the major problems confronting even the best planned system is adjusting to increased loads. The problem is considerably simplified by the use of compact power units. An existing power unit can be replaced by one of larger capacity with a minimum of difficulty. With comparatively few connections to change, labor is reduced with consequent less service interruption.

The somewhat higher initial cost of a compact power unit can be justified. The installation costs are much lower than the costs asso-

One Fixture Cost . . . One Installation Cost

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C.S.A. APPROVED Pat. Pend.

for AIRPORT RAILROAD BUS TERMINALS

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This complete shallow unit (available for surface, corner or recessed mounting) has built-in recessed roto sockets that swing 90° in all directions through a complete 360° circle . . . and stay put at any angle. Available in stock sizes of 2', 3', 5' and 8' lengths.

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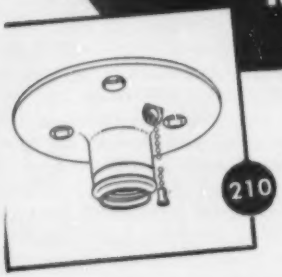

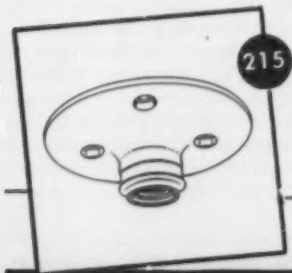

There's a big profitable market for these two Massey high quality electrical wiring devices because they are practically indestructible, lightweight, easy to handle, low in cost and economical to use. Both 5" dia. listed by U. L. Inc. Meet Fed. Spec. W-L-142. Designed for use with 3¼" and 4" Boxes. Groved for shade holders.

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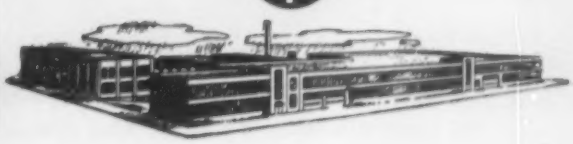

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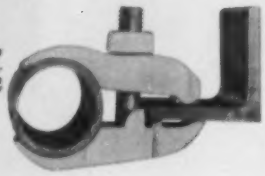

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14 SIZES TO FIT STANDARD CONDUIT & PIPE DIAMETERS 3/8" THRU 8". Furnished with or without stove bolt.

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ciated with a conventional installation. While appearance cannot be directly evaluated, most engineers will agree that from a public relations standpoint, appearance should not be overlooked. Space can only be obtained at some cost; reduced space means reduced cost.

As loads grow, equipment size must be increased. The compact power unit makes a quick, low-cost, changeover possible. The factors which influence the use of compact power units in shopping centers apply as well to schools, public buildings, hospitals, and large apartment buildings.

Substation size

(Continued from page 75)

here to be the most economical. Such items are:

(a) Expense and difficulty in obtaining right-of-way to carry subtransmission lines to several smaller substations favors fewer substations of greater capacity.

(b) Expense or difficulty in obtaining real estate sites for substations likewise favors the use of fewer substations.

(c) Lower evaluation of losses will favor larger substations. This is true since the losses in the 12-kv express feeders are one of the largest economic factors against large substations.

(6) Sometimes it is proposed to locate a 12-kv substation on the edge of a load area and reach into the area with 12-kv express feeders instead of extending subtransmission lines and locating the substation within the area. While it is practical to do so to a greater extent with 12-kv because of its "greater reach" as compared to 4-kv, the economics of doing so should be closely examined.

For example, at 6000-kva per feeder, if a mile of express feeder costs $10,000 per mile and the peak losses for 336.4 mcm aluminum of 64.5 kw/mile are evaluated at $200/kw the total cost per mile of express feeder is $22,900. This is $3.82 per kva per mile. This is still enough to encourage locating the 12-kv substation near the load even though it is considerably less than something in the order of three times this or $11.00/kva/mile for a 4-kv, 2000 kva express feeder.

(7) Comparing Figure 1 with Figure 3 indicates that at lighter load densities the cost of H.V. and L.V. lines is greater than the cost of substations. As the load density

increases, the cost of substation equipment becomes an increasing percentage of the total. At 8000-kva/square mile the substation cost is considerably greater than the cost of H.V. and L.V. lines. This indicates that proper selection of substation size and efforts to minimize substation cost by standardization and simplification are increasingly important at higher load densities.

(8) Some information can be obtained regarding selection of subtransmission voltage. The data in Figures 1, 2 and 3 includes only the cost of subtransmission lines within the load area. It does not include differences in making power available at 69 or 138-kv from some higher system voltage such as 230-kv. Neither does it include differences in cost of covering the distance from the edge of the load area to the actual location where bulk power is available. These must be properly evaluated and added to the data given here for covering the load area.

It can be determined, however, that when using the most economical size substation with each voltage, the added cost of 138-kv over 69-kv within the area is $5.60/kva at 1000 kva/square mile, $3.30 per kva at 2000 kva/square mile and $3.10/kva at 8000 kva/square mile. This indicates that the penalty within the area decreases with increasing load density. Also, if power should be available at 138-kv, it would not be economical to then step it down to 69-kv to bring it into the load area.

Lighter load densities

A 6000-kva feeder covers an area of 6 square miles at a uniform density of 1000-kva/square mile; 3 square miles at 2000-kva/square mile. This may be more exposure on a single feeder than is felt justified and a lower feeder loading may be used until the density increases. The feeder loading may then be allowed to increase along with the density. The effect of such reduced feeder loading on economical substation size, based on 3000-kva/feeder at 1000 and 2000-kva per square mile, has been studied.

A comparison of four and eight feeder substations for 1000-kva/square mile shows that the single transformer bank four feeder substation is slightly less expensive than the eight feeder substation at both 69 and 138-kv; however this is at some sacrifice in service continuity. The difference in cost between the three substation arrangements is not too great and actual selection might well be based on the ability to expand the initial equipment to a larger size as load density and feeder loading is increased.

A comparison of four to sixteen feeder substations for 2000-kva/square mile shows that the eight feeder 24-mva substation is the least expensive at both 69 and 138-kv. However, the added cost for twelve or sixteen feeder substations is only about $1.00/kva. These larger substations are more economical at this lighter feeder loading due to reduced express feeder losses.

With the reduced feeder loading, the total cost is found to vary less with substation size than at higher feeder loading. Therefore it would appear that initially the substation sizes and locations should be selected to permit growing to the most economical arrangements in the future.

(The complete study from which this article is adapted is available from General Electric Co., Schenectady, N. Y.)

Distribution costs

(Continued from page 66)

senger which would serve as the common neutral, would reduce voltage drop by 35% and reactive loss by 78% below those produced by the open-wire bus. The triplex bus was therefore decided on for trial purposes.

Service loop messengers were deadended on the bus messenger but within easy reaching distance from the pole. Aluminum clamps were used which served the dual purpose of connecting the service loop messengers to the bus messenger both mechanically and electrically. In this way the pole was kept clear for climbing and working convenience, while the difficulties entailed by the practice of midspan tapping were avoided. The accompanying illustrations show this arrangement. A new clamp, very recently introduced on the market, which relies on friction only to hold the service messengers, promises to reduce installation time even further.

The connections to the insulated legs of the bus were made with newly-developed connectors. With this type of connector, the taping of service connections is eliminated by the use of insulated covers. Once the connector has been in-

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This powerful, new outdoor floodlight concentrates its light in a long range, oval-shaped beam, producing 120,000 candlepower with only a 500 watt rating. That's almost *twice* the maximum beam candlepower of general service lamps in the most efficient reflectors. Lamp life is rated at 2,000 hours.

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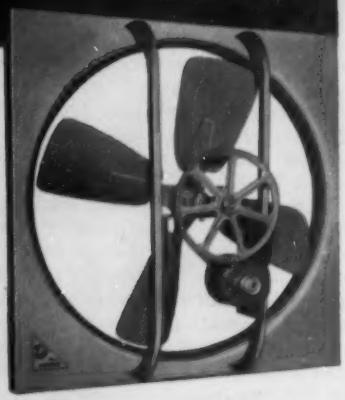

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November, 1956

stalled, subsequent service loop connections can be made or broken with the bus energized. This is accomplished by means of small access holes through which a hexagonal key can be inserted to connect or disconnect the individual service wires. Furthermore, future pole relocation, if necessary, can be accomplished without disturbing the services.

There are other advantages favoring the installation of triplex secondary bus. Since only two or three inches of pole space are required to attach the bus to the pole, it is quite possible that shorter poles may be used, particularly in cases in which the primaries are only single phase. Not the least benefit to be derived from the use of triplex, provided that it is neatly run, is a marked improvement in the appearance of pole lines serving residential developments. The secondary rack used with open-wire secondary bus is eliminated, and the three separate wires are replaced by one small cable.

Mechanization reduces cost of setting poles.

In another battle in the war against increasing costs, the company recently purchased a 9-ton-capacity mobile hydraulic crane for the primary purposes of setting large transformers on pole-mounted steel platforms and for setting poles exceeding 60 feet in length. Our experience with a 3-ton mobile crane proved that a net reduction in the setting time could be achieved through the crane's elimination of much of the complicated rigging and "bull" work which would otherwise be necessary. As good as it was, however, its limited capacity still left many difficult time-consuming jobs to be performed primarily by the linemen. A further economic study of these operations resulted in the purchase rather than the rental of the higher-capacity crane to replace the 3-ton unit.

The first job that the new crane was used on involved setting a 105-foot microwave antenna pole. The equipment was at the job location for a total elapsed time of two hours. In the past it would have been necessary to first set a long gin pole before a pole of this length could have been installed. A total elapsed time of approximately nine hours would have been consumed. The saving in direct labor and transportation costs for this job resulting from the use of this crane, was approximately

$175. An estimated annual saving of $3,400 seems to be a very conservative minimum.

The new hydraulic crane can be used on any part of our distribution system which can be reached by truck. Excellent control and accuracy in the setting of heavy loads is afforded by the hydraulic controls.

Distribution practices

(Continued from page 65)

the job is spread out to require more illumination.

Of serious concern was the safety of garage repairmen who would not normally know of the 115 volt d-c circuit. To reduce this possibility, the 6.3/115 volt transformer and the Selenium rectifier were mounted in a locked compartment with the two-way radio equipment. The wires from the generator to this compartment are enclosed in flexible conduit and the 115 volt d-c conductors are fully insulated. So far, the use of our portable tool circuit has been accepted with zeal, and serious consideration is being given to outfitting other vehicles with similar equipment.

Second evening crew added

The special line crew, basically, was available to handle the emergency work that it was capable of performing. When no trouble work is imminent, this crew executes maintenance work orders and during daylight hours can complete any type of line construction duties. After dusk, our crew is generally on streetlight, maintenance or trouble work.

As we operated, various jobs were always available and this special crew effectively and efficiently came into its own. Service reliability was considerably improved and after six months of operating experience an additional crew was put into operation July 7, 1956. This second crew gives us dual coverage on Monday, Tuesday, and Wednesday with at least one crew on duty the other four days. Of course, all emergency repairs cannot be handled by these two special service crews and, when necessary, regular crews are called out on an overtime basis.

Within the Greater Miami area, we have a considerable amount of underground power and street light cables. Normally for underground power cable trouble, the regular cable splicer crews were called out on overtime. The same problem was present as with our overhead crews, in that the customer waited while our men were traveling to the work location, etc. In February 25, 1956, a special cable splicer crew, consisting of a cable splicer and helper, was put into operation to normally work 4:00 p.m. to midnight, Monday through Friday.

Novel truck design

This special service crew operates from a standard walk-in type truck of 10,000 lb. GVW with a standard transmission. With this type of truck and body, all the compartments and bins open from the inside and an extension ladder is the only equipment on the outside of the vehicle. Underground trucks frequently have to park on busy streets and the safety of personnel is of paramount importance.

The special cable splicer crew has the same setup for the 115 volt d-c circuit as the overhead crew and, in addition, has a 10,000 gallon per hour pump mounted on the front bumper. The pump is driven via a special clutch arrangement from a crankshaft pulley. The operating experience of this pump is most gratifying and in the future perhaps it will be our standard. Since the walk-in type body was new to our cable splicers, loose dividers were provided for the shelves and tacked in position after arrangement by the men themselves.

Handle long splicing jobs

The special cable splicer crew differs from our special line crew in that it can perform construction work at any time. The nature of underground cable work makes this possible. One important phase of our work that this crew has been able to effectively take over is splicing jobs that normally would require more than the regularly scheduled eight hours. Emergency underground work as well as new vault construction and maintenance work orders are just a few of the assignments for this splicer crew.

The first special cable splicer crew proved itself and on July 7, 1956, a second crew was put into operation for additional coverage. The underground crews operate the same schedule as the overhead crews, i.e., crew #1 Saturday through Wednesday; crew #2 Monday through Friday, 4:00 p.m.

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to midnight. If excessive trouble presents itself, regular crews are called out on an overtime basis, as before.

At the present time the second crew does not have a front-mounted pump and must carry one of our regular manhole pumps on a small two-wheel trailer. H. L. Allen, our automotive equipment superintendent, is modifying the second truck so that the pump itself (same rating—10,000 gal. per hour) will be mounted in a convenient place inside, with only the nozzles to be seen from the outside rear. It will be driven by a fluid motor. This improvement will present a neater appearance with the same high efficiency. Due to the high water table in our area, to have an operable pump available at all times for underground work is imperative! We think this pump will fill the bill.

Line work de-centralized

Several years ago our line construction forces were de-centralized. In the Miami area, we maintain four separate work locations: Central, Northwest area, Southwest area, and Miami Beach. A new Northeast Yard is expected to be ready for operation early in 1957. These work locations operate individually, with definite boundaries, personnel, etc. Each yard supervisor is responsible for the construction and maintenance in his area and generally has from 115 to 200 men with equipment at his disposal.

Close cooperation is maintained between the various work locations and the Trouble Section so that proper construction and maintenance work is available as fill-in work for the special overhead and underground units. Trouble supervisors are scheduled around the clock to coordinate these various activities and to be available for regular crews, should they be on overtime jobs.

Service to our customers is paramount with us here at FP&L. The most efficient and effective method of achieving this goal is our aim. We know that our special service crews have improved our efficiency and think that the unusual physical plant with which they work has helped.

Growing loads

(Continued from page 61)

dition of unexpected load, the use of a 10-kva 5 per cent autotransformer on the customer's service has been found to provide immediate relief until permanent corrective measures can be taken.

d. Approximately $15 per transformer is saved by omitting taps.

e. Reduction in operating expenses has been achieved by not changing taps, keeping books on transformers which are changed, and returning the taps to normal.

f. Reduction in high voltage complaints during the winter months.

g. It is believed that a reduction in transformer failure rate will be achieved by not opening the handhole covers on transformers occasioned by tap changing. The most prevalent cause of transformer failure of the CSP type transformer on this system has been found to be caused by the entrance of water into the transformer.

5. Selective fuse-breaker coordinated circuits, of which there

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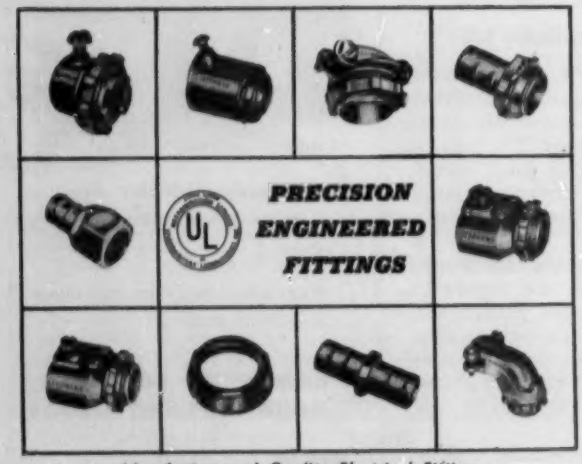

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Pages 140, 141, 142

are now 102 out of a total of 143, are periodically reviewed for changes required by increased load and changing circuit conditions.

Distribution standards

(Continued from page 63)

pectancy of poles now being installed, (2) our line construction department's preferences in regard to working clearances and preferred arrangements of equipment, and (3) the telephone company's pole-space requirements.

Tentative structure drawings and installation instructions are, in general, prepared by the System Distribution Engineering Department. This is preceded by a study of drawings and photographs of similar structures in use in the 5 divisions of our company and in the standards catalogs of our company and of several other companies. Then a tentative drawing is prepared, using the same basic dimensions as are used on all our line structures.

The proposed new structure is then built in our test-yard area using standard construction practices, if the structure design presents some new problems. Photographs are taken of the structure and prints are made for each member of the Standards Committee. The structure is built on short poles so that committee members can readily check each part of the structure at the next meeting in our headquarters city.

At the regular meeting, each committee member receives some or all of the following material: copy of the proposed drawing; a photograph of the structure; a memorandum regarding the design problems, costs, etc.; test reports; and a summary of the different division's structure drawings.

A member of system engineering department or of the committee will discuss the proposed drawing. Following that, the meeting is thrown open for discussion. Then appropriate action is taken, which may be approval or revision, or requests for more information.

When the drawing is approved, a number is assigned to the drawing and this same number is put on a file folder which contains all the work sheets, a list of all reference material used in preparation of this drawing, etc.

The procedure for approval of materials is divided into two parts for convenience. The first part deals with materials which we have used, and the second part deals with new materials with which we have had no experience.

The material and supplies catalog of this company was prepared about six years ago by the stores department. This lists all the items which were in the distribution stores at that time, and subsequent revisions cover the newer items.

The Standards Committee reviewed this catalog and classified each item as one of the following: approved for future purchase; materials not to be purchased but to be returned to stock; materials not to be purchased, nor to be returned to stock. Past experience generally indicated whether or not the items were satisfactory.

The number of satisfactory items was reduced by selecting one from each group of equivalent items. For example, guy clamps are made in many shapes and sizes, and several of these were in use in our company. Samples were obtained and carefully studied. EEI standards are generally followed, if available. One which is made by several manufacturers was approved. This process eliminates unnecessary variations.

Following such a decision, all the usable non-standard material is installed on new construction before any standard material is issued.

The manufacturer's representatives and supply houses are notified by the purchasing agent of each decision which concerns them. Arrangements are made to use any items which they have stocked solely for our company.

Special "materials meetings"

Naturally, each manufacturer wants his new product added to the approved list of equivalent materials. To keep this from taking up too much time at each meeting with an odd item or two, the committee has designated two sessions a year, at six months intervals, as "materials approval meetings."

Salesmen, knowing this in advance, can be prepared to submit their goods at the right time, and thus an orderly procedure can be set up whereby new products can be introduced to the committee

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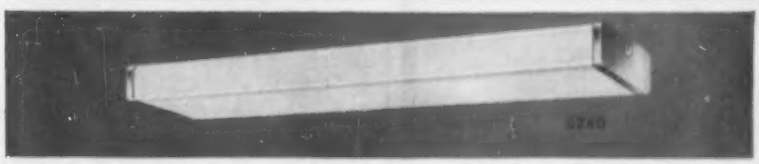

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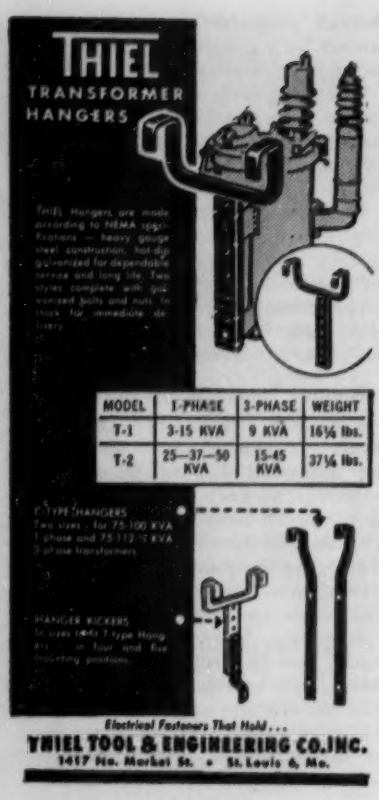
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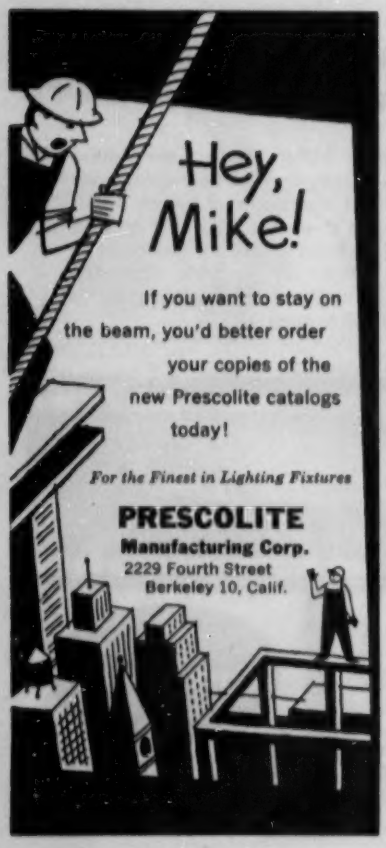
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and to the company.

The procedure for the approval of new untried materials is more involved and requires more time. For this part of the material program to be successful, it is advisable to have the materials on hand. The manufacturer's representative furnishes a sample or several samples if we desire to test the material. The samples are tagged with the manufacturer's name, catalog number, rating, cost, etc. The manufacturer furnishes as much of the following as seems advisable: a description of the special features, if any; catalog pages; test data; a list of users and a report on field experience; or the date the material will be in production.

Tests may be made by us if the manufacturers' data is incomplete. A report is made of each test, a number is assigned to the report and copies are prepared for the committee. Tests are carried to destruction if possible, in order to determine the ultimate strength of the material.

If the material is to be used with some other material, for example, a service wedge clamp is used with twisted service cable, samples of both materials are obtained.

Everyone at the meeting handles the materials, discusses installation, and observes their operation. This rigid inspection by the entire group will eliminate most of the unsatisfactory materials before they get into our stores.

Tabulations of costs of alternative materials which perform the same function are also presented.

The adoption or rejection of the material depends upon the divisional members of the committee, who vote for or against. The chairman may vote to break a tie. When the material is approved, it goes into the book.

Field trial plan

However, when new materials are different from anything used previously, they are approved for a "field trial." After a suitable period, field reports are prepared for the committee, and then the material is approved or rejected.

The stores department issues a letter following each meeting of the Standards Committee. The letter is sent to storekeepers, purchasing department, and Standards Committee. It lists the number assigned to each item, describes it, and provides several manufacturers' names and catalog numbers for each item. The recipients of the letter post this information in their materials and supplies catalog, and the storekeepers change their records promptly.

The purchasing department notifies the suppliers suggesting quantities to be stocked. If this material supersedes some previously approved material, appropriate arrangements are made to use the old material.

Surplus material reports are issued every two or three months by the system storekeeper, and this material is transferred between divisions until stock is reduced to the working level. Then our company may resume purchases of that item.

Some surplus materials require the consideration of the Standards Committee. For example, small transformer accumulated recently in large numbers. The committee members suggested several plans which were adopted.

It has been our experience that improvements in material items which are requested by a standards committee generally receive serious consideration from the manufacturer.

Many of these requests stem from our practice of saving all material which fails in service or during installation. Each item is tagged with all pertinent information regarding the failure. This material is collected at the division headquarters warehouse.

When the committee meets in that division, they inspect this material and decide what steps to take. For example, the committee might send the manufacturer a report on the failure and request the manufacturer to improve the design, or they might change to another type of material, etc.

Standards handbook

Our distribution standards when finally adopted are embodied in printed sheets and become a part of the handbook. The book is divided into 20 sections, and each section has its own index which makes it easier to revise the index as new drawings are added. The number on each drawing indicates where it should be placed in the book.

Our standard handbooks are made in two sizes, the larger of the two holds 8½ x 11-inch sheets and is in the form of a three-ring loose leaf binder which opens flat making it easy to write in it. This large

ing placed in service. This type of

After all parts have been properly

binder is principally used for desk work.

For the construction department personnel, a smaller size binder measuring 4¼ x 7-inches is utilized so that it can be carried in coat pocket or automobile glove pocket. At present, we have in use 637 of the small books and 180 of the larger size. Each book is numbered, and they are distributed to employees at all levels from officers to apprentices.

After several years of use, we have found that the benefits accruing from our distribution construction standards may be observed in many departments of the organization. In general, we have found that the construction standards lower engineering costs, lower construction costs, result in safer line structures, lower maintenance costs, and better inform the employees.

Similarly, the standard material catalogs have benefited us through reduced inventory investment, reduced warehouse space required, facilitated finding desired materials in a warehouse, provided better materials and equipment, reduced the cost of materials, and simplified purchasing procedures.

Business profits

(Continued from page 51)

Hooper said, "in this otherwise happy picture is distribution. The problems of getting that production to the right place at the right time and in the right quantity will become increasingly difficult unless the distribution machine is put in tune with production."

He pointed out that the wholesaler remains because he performs a vitally necessary service—collecting, storing and distributing goods with the least possible waste of time, space and manpower. As long as the wholesaler is able and willing to perform these functions that can not be eliminated, more efficiently and more economically, he cannot be replaced.

" . . . . if we were going to be successful in getting manufacturers to view wholesaling as a part of the national economy, we would have to emphasize the 'concepts of value added by distribution,' " Mr. Hooper maintained.

Maintaining regulators

(Continued from page 53)

ure should not occur until a comfortable old age is reached. Metallic rectifiers of the selenium type may deteriorate if they are stored for long periods of time without be-

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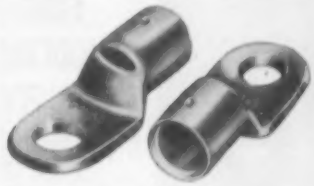

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ing placed in service. This type of deterioration is usually not serious because its effects are generally offset when the stacks are placed in service.

Electrolytic capacitors (condensers) gradually dry out whether they are in storage or in service, so that after several years they may develop heavy leakage as shorts.

Ordinary aging of regulator components is greatly accelerated by abnormal operating conditions such as excessive moisture, or ambient temperatures which are either above or below the values for which the unit was designed or rated. Metallic rectifiers must be sharply derated with increases in ambient temperature, consequently they may fail quite rapidly if subjected to temperatures which are well above their thermal rating.

Operation of regulators at voltages and frequencies which are outside the limits for which the amplifier was designed (especially *over*-voltage and *under*-frequency), may result in overloading of regulator and consequent failure. Component overloads may also be caused by grounds in the regulator or in associated equipment, which results in the flow of large fault currents through the regulator circuits. Grounds in associated equipment and abnormal system voltages and frequencies may be transient in character, so that they are difficult to locate and establish as the cause for failure.

A damaged regulator must be carefully inspected to make certain that all components in an unsatisfactory operating condition are discovered. Damage to magnetic components is usually indicated by burned, charred, or blistered insulation or paint, and by low insulation resistance between the various windings or between component windings and their magnetic cores.

Damage to metallic rectifiers is commonly signified by darkening or burning of the material on the rectifier plates, adjacent to the plate contact surfaces. In general, it is necessary to make a capacity test of oil-filled and electrolytic capacitors to determine if they are in a satisfactory operating condition.

Repair of statomag-regs

Damaged components of a regulator which has failed should be replaced with equivalent parts obtained from the manufacturer. After all parts have been properly installed and wired, circuit connections should be checked to ascertain that they are secure and correct. Variable resistors which have been replaced must be adjusted to proper values. All regulator circuits should then be tested for grounds.

It is usually desirable to test a revamped regulator before returning it to permanent service. In many cases this can be satisfactorily accomplished by connecting the unit to a separate source of power while leaving the regulator output circuits disconnected. Where a separate source of power of the proper voltage and frequency is not available, it may be possible to energize the amplifier from circuit to which it is usually connected, while operating the system which the regulator normally controls by manual means. Where neither of these procedures can be followed, it may be necessary to connect the apparatus to its associated equipment in the usual manner and then carefully program a test run.

When the amplifier is initially energized, it should be carefully observed to determine any behavior or temperatures that are an exception to the normal conditions expected of this equipment. Where manufacturer's technical data is available, circuit voltages should be checked in accordance with specific instructions applying to the particular equipment involved. If overheating does not appear after the regulator has been energized and *loaded* for approximately 15 to 30 minutes, it is to be assumed that it is safe to operate the device with its associated equipments.

Circuit adjustments should then be made in accordance with applicable instructions. When adjustments are complete, the system and equipment controlled by the regulator should be operated in the normal manner to ascertain that regulator performance is satisfactory.

The maintenance required by a static magnetic amplifier (statomag-reg) will depend upon its complexity and the service to which it is subjected. Large and complicated regulators will need more attention than small, elementary units. Regulators which must provide maximum reliability, or which are subjected to operating conditions involving unusual vibratory effect or unusually abnormal temperatures should be

vision is impossible. Also there is ' to be a novelty, it is expected that

given more attention than those installed in ideal locations and not handicapped by external hazards.

In all cases, maintenance personnel should familiarize themselves with the construction, circuitry and operation of these devices—devices which they must ultimately service in order that they may provide interruption-free and faithful service.

Furthermore, adequate testing equipment and instruments must be available if their efforts are to be successful. The performance records of equipment now in service have demonstrated that static magnetic regulators will provide excellent performance and maximum reliability with a minimum of maintenance, if this *maintenance* is regular, thorough, and properly related to the regulator design and application.

Shopping centers

(Continued from page 46)

better, and this original "outside" design was not made by the engineers who laid out the rest of the job. However, the situation has been helped by good lighting of the store fronts and walks, and by special color-corrected mercury vapor lighting put in at proper intervals by the power company on a public street that runs through the parking space.

Some trouble was caused at first by the flood light bulbs burning out because of the heavy load in the area, but this was met by using over-voltage bulbs. The standard reflectors provide adequate ventilation underneath for normal load conditions.

There are 1,050 tons of air conditioning in the two buildings now in use, with 350 tons planned for the third now nearing completion. The design calls for individual package units of 5 tons and up for direct air cooling of most of the ground-floor stores. For the large restaurant and a big chain drug store, and for the second-floor offices, individual centrifugal cooling systems are used up to 250 tons capacity. Heater strips installed in the air ducts, or hot water circulated through the same pipes that carry chilled water in hot weather, supply what heat is needed for the mild winters. Retailers prefer individual systems because then they pay maintenance only on the service each store gets.

A 125-ton Trane Centra-Vac was used in one building, and a 250-ton Worthington centrifugal unit for the J. C. Penney store. Designers feel that when central or other cooling is *not* provided by the building owners, plenty of oversize electrical feeders should be installed in the original job to provide for individual stores to put in their own systems later. Retail establishments do not require as much power as some others, but eventually many of them want considerable electrical equipment including air conditioning, and bringing in additional feeders later is more expensive and never makes as neat a job, they say.

Lessons from job

Among the industry "lessons" demonstrated on this large job were: First, the importance of giving the engineers *time* enough to make a sound detailed design far enough in advance of the building construction. Also letting contracts soon enough to permit the subcontractors to plan and time their installation layout better. This is especially important on projects limited to a tight budget by competitive rental prices; for designers feel that much better jobs could be done for the same money if some of the "time" pressure were taken off, so that smaller and more skilled crews could work with better layouts and supervision.

Second, the need of subcontractors and suppliers to check with the power company on the exact voltage available for motors and other equipment. Some 230-v delta equipment was delivered which was not suitable for the 208-v wye system and had to be replaced.

Also the need to "sell" all individual stores on the idea of selecting only top-grade fixtures for best and lowest cost service in the end, maintenance and interrupted service being considered. The need of training schools for electricians to supply more all-around skilled journeymen. When 100 men have to be hired in a hurry, it is discovered that many of them do not know how to do all kinds of trade jobs; and when a lot of men are used is just the time when training and detailed super-

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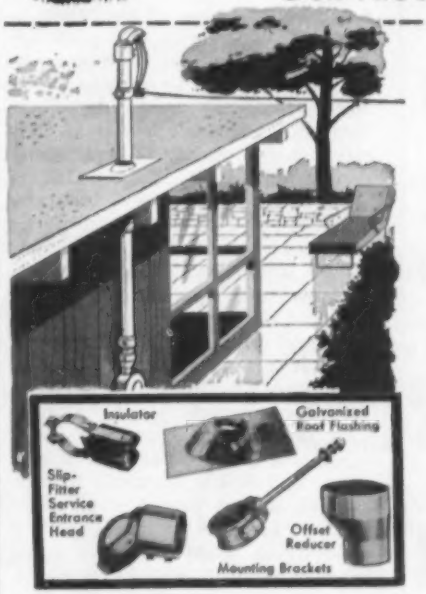

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vision is impossible. Also there is need of schools to train outstanding electricians to be foremen, especially for times when additional foremen are needed on big jobs. Technical high schools could offer these courses at night, and some now do.

On the general subject of shopping centers, industry observers say that while reports of excessive speed-ups and skimping are more common in the competitive areas where there are already other centers, the trend is in that direction in other cities as well. Developers who stressed quality on their first few jobs are now noticeably more cost conscious and disposed to cut corners on later projects—after they have "toted up" the cost, rental, and sale-price figures.

The hopeful trend in the other direction is that long-term real-estate investors are beginning to get more complete appraisals from their own engineers, and to inquire closely about the quality of equipment used in specific jobs, before they make an offer to buy. As these mushrooming centers cease to be a novelty, it is expected that a clearer distinction will be made both by investors and big national chain stores between the soundly-engineered developments and the more or less jerry-built jobs, which designers say *may* gradually deteriorate into submarginal properties, just as some of the unsound housing developments did. It is believed that store owners will come to see that bargain rents are not always the soundest foundation for a long-term retail business. Maintenance costs are important too, and some say that leases based on annual gross sales by stores would give more leeway for quality installations.

In the meanwhile, informed electrical trade opinion is that designers and especially contractors who have not worked on this type of job previously should first take a good sharp look at each individual project and size up the particular situation before bidding. Those who have "been there" say that most of these contracts *have* to be estimated on close profit margins—but that this can be overcome if it is possible to negotiate for a really sound design and a reasonable deadline permitting efficient organization of the work. And that this is important not only to the contractor and to the industry, but is in the long-term interest of the developer as well.

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Farm power

(Continued from page 47)

requirements—one of the substantial costs of farming. It is a known fact that a 1-horsepower motor can do as much work in an hour as an average man can do in a day. Furthermore, there are few tasks that electrically operated equipment cannot perform.

Probably the greatest advantage of farm electricity is its ability to cut production costs. An Ohio farmer underscored this fact when he found that the cost of grinding a ton of grain with electric power averaged only 18 cents, compared to $1.60 previously paid.

Increased production is another important benefit to the farmer from the use of electricity. Records show that regular watering of farm and truck gardens in the Eastern United States with pressure water systems increased the yield by as much as 50 per cent. Electric lights in the poultry house increases egg production 10 per cent in fall and winter when prices are higher. Cows that can get plenty of water all the time from an electric watering system give richer milk—containing 6 to 12 per cent more butterfat—than cows that have to wait for periodic watering. Farmers having electric hay dryers installed in their mows have records to prove that their cows produce more milk when they are fed mow-cured hay. Electric lighting facilitates many farm operations particularly in winter, thus shortening the farmer's work day and making his tasks safer.

On modern farms electrical equipment also works to preserve perishables and maintain quality. Rapid cooling keeps the bacteria count low and maintains the quality of milk. A milk cooler will cool 10 gallons of milk with about one kilowatt-hour of electricity. Other electrical devices help the poultry farmer send more eggs to market at top quality.

Tests have shown that farmers can cut pig, lamb and chick losses by the use of simple electric brooders.

The Department of Agriculture has estimated that $5.3 billion, or an average of $1,100 per farm, will be spent by U. S. farmers on electrical equipment-appliances during the period 1956-1960.

Water systems head list

Water systems are high on the electrical shopping list for farm families. An electric-powered water system makes it possible for the farm family to enjoy city conveniences on the farm, but even more, it eliminates the chore of pumping and carrying water to livestock and poultry. Installation of a water system opens the door to many conveniences that require running water. The 1954 Census shows more than 50 per cent of U. S. farms with water systems. Every farm needs a water system,

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and the sales opportunities are excellent. The new market, the replacement market and the farms needing more than one water system should make 1957 the best year yet for water system sales.

The market for farmstead lighting is largely a replacement market. Practically every farmstead lighting installation more than five years old is obsolete or inadequate for safe and efficient farm operation. A concentrated farm lighting program could mean added sales on nearly every farm. This tremendous potential market is substantiated by the Department of Agriculture's estimate that lighting and wiring sales will account for about 20 per cent of the total farm investment in electrical equipment and appliances during the next five years.

Farm chore equipment, which includes barn cleaners, silo unloaders and ventilation, often represent the difference between a profitable and a non-profitable dairy farm operation. These time consuming tasks, previously demanding hand labor for long periods each day, now can be completed mechanically in minutes. Mechanization of farm chores—in contrast to field operations—is just beginning to be practiced. This creates a brand new market for industrious and far-sighted sales personnel, and opens up new possibilities of efficiency and stepped-up production for farmers.

Sprinkler irrigation is rapidly finding its place in profitable farm operations, even in the more humid areas. More and more, irrigation is being depended upon to make the difference between a poor crop and an excellent one. The water supply is the limit to sales potential and farmers are finding ways to store run-off water for dry season use.

Grain and hay have long been the backbone of farming. These accounted for 31 per cent of the total farm output and 87 per cent of harvested acreage in 1955. Thus it is an economic necessity that farmers get top quality grain and hay. By cutting the hay, moving it immediately into the barn, and curing it via electric blowers, the quality is greatly improved over field-cured hay. Modern farming methods have come to dictate the use of crop and grain dryers. At least 50 per cent of our grain and livestock farms will ultimately be prospects for drying equipment.

Electric brooders, both chicken and pig, have been developed to reduce farm labor and prevent loss. Brooding, long used by the efficient farmer, is becoming a common everyday application. Over 75 per cent of the reporting farms lacked modern pig brooders at the time of the 1954 Census. Any livestock or poultry farmer needs brooding for successful and economical operation, and the newer types of brooding equipment make it practical for most farmers to have this production aid. These are the infra-red lamp type and the heating cable buried in a concrete slab.

Adequate farmstead wiring is the heart and soul of an electrically-operated farm; without it there is a ceiling placed on the farmer's use of electric power. He may find that lights dim when the refrigerator starts up, fuses blow out or circuit breakers trip. Overloaded circuits make it impossible for equipment to provide efficient service; they waste electricity and even constitute fire hazards. Over 93 per cent of all U. S. farms are now wired for electricity, but few have adequate farmstead wiring. Because of the direct tie between adequate wiring, the expanding use of electricity, and the condition of present farm wiring, promotional efforts to improve farm wiring should be organized on a year-round basis.

Household appliances

The importance of electric household equipment on modern farms is recognized in the 1957 Farm Power Use Calendar.

Although food freezers are "at home" on the farm—where perishable fruits, vegetables and meats are produced—less than 35 per cent of reporting farms had them at the time of the 1954 Census. The 2-zone refrigeration (including a freezer section) is also included in the calendar because of its utility for small rural families and as an adjunct to the freezer.

Modern laundry equipment is fast becoming a favorite of the farmer's busy wife. Dryer promotions during the cold winter months can double the number of installations within a few years. The market has been opened wide by the farm women who first obtained the modern equipment and then publicized their satisfaction to friends and neighbors.

The twin infants of the farm electrical market—air conditioners and electrical heating equipment—have an open and bright future. The rural market for both has hardly been scratched; more than four million farm homes, for example, are on the potential list for modern room air conditioning. The power supplier is interested in selling air conditioning and house heating together because it means a year-round load.

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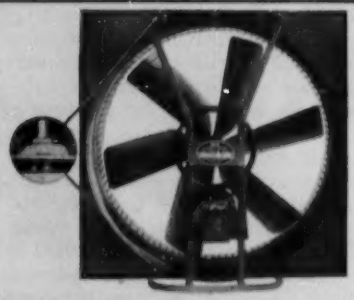

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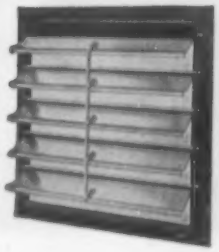

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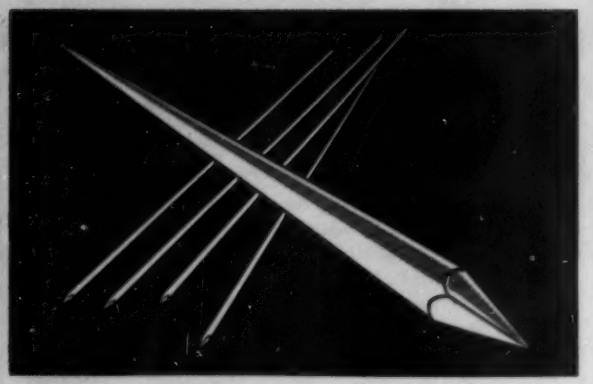

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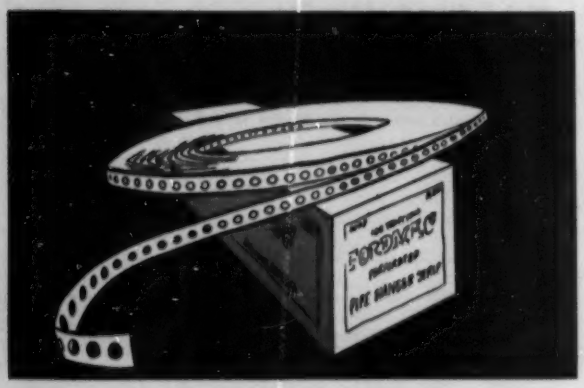

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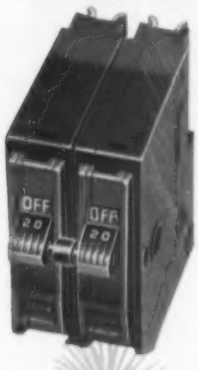

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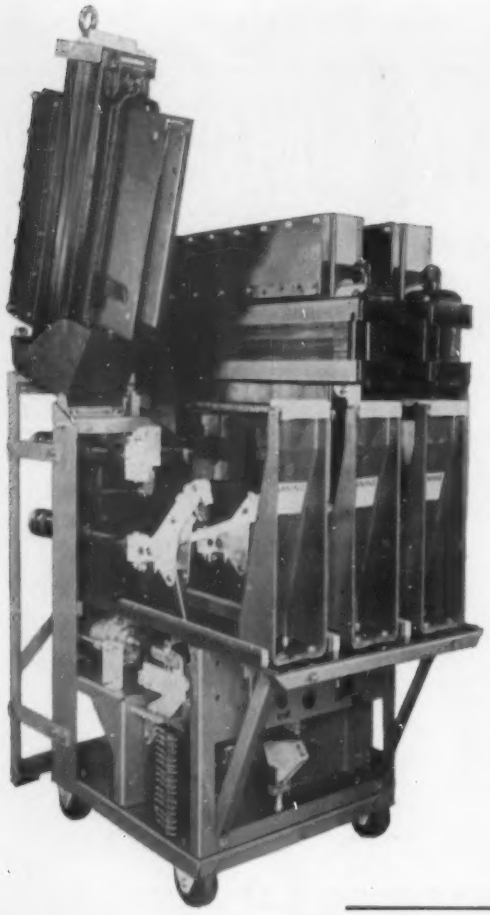

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5HV-350	**1200-3000**	4.16	**350**
7.5HV-250	1200-2000	7.2	250
7.5HV-500	1200-2000	7.2	500
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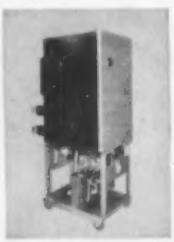

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